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Editorial Comment

Co-operation in the Metal Industry

IT WOULD have taken no more than one glance at the Auditorium in Atlantic City during the week of October 18th to realize how vast is the scope of metal products manufac.uring: from cast iron to platinum; from the raw ingot to the plated and polished product.

Outstanding features of the exhibits flashed before the eye. Welding is growing apace; automatic methods of processing are increasing, and the object is not only greater speed and lower cost, but finer, stronger and better looking products. Metal cleaning, plating and finishing exhibits were greater in number this year than ever before.

About the technical sessions praise is superfluous. The list of papers, the names of the authors, the large attendance and the active discussions spoke for themselves.

The Nineteenth Annual Metal Congress was a shining example of what co-operation in an industry, can do for it.

Zinc Oxide Fumes

THE short article on Zinc Oxide Fumes, published in our August issue, page 405, which discusses the symptoms of zinc chills ("spelter shakes"), has impelled some of our readers to point out to us that this type of fever is far from the deadly evil which it is (in some less informed circles) supposed to be. Dr. Drinker and Dr. Fairhall in their monograph "Zinc in Relation to General and Industrial Hygiene," (Public Health Reports, Volume 48 No. 32, August 11, 1933) state the following:

"A single industrial condition arises from zinc and this condition is not produced by zinc alone. This is the 'zinc chill,' better known as metal fume fever. The different groups of symptoms described as chronic industrial zinc poisoning, together with other complex ills which have been ascribed to zinc, may be disregarded, as they are due to contamination by other substances.

"One may sum up the evidence in regard to the zinc chill as follows: it is a decidedly unpleasant experience and, to a mild degree, incapacitates one the day following the attack. Where the inhaled oxide is uncontaminated by other metals, there is no definite evidence of chronic damage even from repeated chills. At the same time the condition is easy to prevent by properly arranged exhaust hoods or the wearing of masks, and conditions making chills possible should be eliminated."

The fact that spelter shakes are merely a temporary unpleasantness, however, does not relieve the foundry of the obligation to prevent them. Roofs sufficiently high to make working space airy; stacks of adequate size and provided with the necessary draft to draw fumes away from the melter, and respirators to insure his protection, should always be part of the equipment of every foundry casting brass.

Business Today

THE last month has witnessed the severest decline in the prices of securities, metals and commodities in general, since 1932. The reasons given are almost as many as the number of people giving them, but the best of informed opinion seems to agree that it was the result of a combination of causes: a temporary deviation from the major trend which still points toward higher levels; curtailment of orders following heavy forward buying in the Spring in anticipation of price rises and of possible interruptions of production on account of labor differences; uncertainty concerning plans of the administration; the unfavorable conditions in Europe and in China.

In the meantime figures have come to light showing conclusively that industry is in a recession; not actually declining in volume, but not increasing in seasonal proportions. The latest figures for employment from the National Industrial Conference Board show that August unemployment is estimated at a total of 6,285,000, an increase of nearly 150,000 over the preceding month.

There are some favorable developments, however. Crop yields will be greater, which will mean a rise in farm income; retail buying is rising at a very satisfactory rate, in more than seasonal proportions.

At a time like this we all hesitate to predict the future. Nevertheless, such a keen observer as Col. Ayres of the Cleveland Trust Co. states that it does not seem probable that the decline in business activity which is now under way will develop into a real depression. We are all waiting anxiously for the results of the Automobile Show which will be the best index of the coming year.

In the meantime also, all of the sounder and saner elements of the country wait for assurance that the Government will put its house in order, achieve a balanced budget and put as few obstacles as possible in the way of continued expansion of business and employment.

National Metal Congress and Exposition

Largest exhibit in the history of the Congress Sessions on metals, welding, wire manufacture and metal coloring. Special lectures and other features.

By H. M. ST. JOHN
Chief Metallurgist, Detroit Lubricator Co.; Associate Editor, Metal Industry

THE nineteenth Annual National Metal Exposition and National Metal Congress, sponsored by the American Society for Metals, was held in Atlantic City, during the week of October 18th. Throughout the week the board walk had the appearance of having been taken over bodily by members of the participating societies, the American Society for Metals, Institute of Metals Divisions and the Iron and Steel Division of the American Institute of Mining and Metallurgical Engineers, the American Welding Society, the American Society of Mechanical Engineers, and the Wire Association.

At the Exposition, held in the Atlantic City Auditorium, were shown displays by 237 exhibitors as compared with 217 in Cleveland last year. The setting for these displays was unusually fine and they attracted a great deal of attention although possibly a somewhat smaller attendance than was generally the case when the Exposition is held in an industrial city.

As usual, the American Society for Metals, sponsor of the Congress and Exposition, appears to have reached new heights during the year just closing. At the annual meeting, held Oct. 20th, the various official reports brought out the fact that the Society, with respect to membership, income, financial reserves, volume of publication, etc., etc., has grown approximately 30% during the past year. The membership, for example, is now stated to be 10,028. *W. H. Eisenman*, Secretary of the Society, remarked in his report that since his use last year of the term "mastodonically terrific", he has exhausted his supply of adjectives. At this meeting also, *Edgar C. Bain*, President of the Society made his annual report and announced the election of the following officers for the coming year.

President, *George B. Waterhouse*
Vice President, *William P. Woodside*
Treasurer, *Bradley Stoughton*
Trustees, *Harvey A. Anderson*
James P. Gill

Mr. Eisenman, of course, continues as the perennial Secretary and the following trustees also continue in office.

Samuel C. Spalding; Reid L. Kenyon; Owen W. Ellis and *Ralph L. Wilson.*

President Bain presented the President's Bell to the *Philadelphia Chapter* for general excellence of chapter activities during the past year.

PROF. G. B. WATERHOUSE
President, A.S.M.

Special Lectures

Throughout the week there was a constant succession of dinners, educational lectures and entertainment events. The joint dinner of the two A.I.M.E. divisions, held Wednesday evening, October 20th, was addressed by *Dr. Harvey H. Davis*, President of the Stevens Institute of Technology, on the subject "*The Place of the Engineer in Modern Life*". *Dr. Davis* emphasized the fact that the engineer, originally a technician, later qualified as a manager, now needs to become an administrator.

A series of three evening lectures on "*Metallographic Technique*" were given by *J. R. Vilella* of the United States Steel Corp. The *Edward DeMille Campbell Memorial Lecture* was presented by *W. P. Sykes* of the *General Electric Co.*, on the subject "*Structural and Hardening Characteristics of Iron-Cobalt-Tungsten Alloys*". *Professor Arthur F. Benton* of the *University of Virginia*, delivered the *Science Lecture of the Metals Divisions on "The Behavior of Gases at Metal Surfaces"*. In discussing this subject Professor Benton made a plea for the simplification of terminolgy, stating that the phenomenon of absorption and other related phenomena are now described by more names than there are ideas to express. With respect to purely surface phenomena, the speaker recognized only two, the physical adsorption which prevails at low temperatures and what he called "chemi-sorption", which in general predominates at the higher temperatures and is a true chemical reaction although it occurs at the surface only and is of no more than molecular thickness.

It was announced at the annual meeting that the 1938 Metal Exposition and Congress will be held in Detroit during the week of Oct. 17th. At that time the British Institute of Metals and the British Iron & Steel Institute will be guests of the participating societies.

During the sessions held throughout the week a large number of technical papers were presented. During the evening of Monday, October 18th, all of the societies attending the Congress together with the American Institute of Physics, sponsored jointly a round table discussion on the physics of metals with *Professor John T. Norton* of the *Massachusetts Institute of Technology* as general chairman and *Professor L. W. McKeehan* of *Yale University* as technical chairman. The following were discussion leaders.

S. L. Hoyt of the A. O. Smith Corp. "*True Stress-Strain Curves for Single Crystals*".

R. K. Haskell of Watertown Arsenal. "*True Stress-Strain Curves for Polycrystalline Materials*".

R. L. Wegel of the Bell Telephone Laboratories. "*Internal Dissipation of Energy in Metals for Small Cyclic Strains*".

Institute of Metals Division Program

The following papers were given at meetings of the Institute of Metals Division, A.I.M.E.

A Theory of Diffusion in Solids, by *John E. Dorn* and *Oscar E. Harder* of Battelle Memorial Institute. In this paper equations for interstitial and substitutional diffusion were developed in support of the author's theory and applications of the theory were indicated. The theory illustrates some of the relationships between the energy of loosening an atom and the melting point, diffusibility and solubility. An explanation is offered to show the mechanism of exchange between dissimilar lattices.

"*The Problem of the Temperature Coefficient of Tensile Creep Rate*", by *J. J. Kanter* of the Crane Co. It has been suggested by previous creep investigators that at small stresses the secondary or constant creep rates obey a simple viscous law. Building upon this suggestion, departure from pure viscosity as stress increases may be expressed mathematically as a consequence of reversibility, altered viscosity or "flowability" in the same sense that temperature change reversibly alters viscosity. Evidence indicates that creep strain above the recrystallization temperature takes place by crystallographically directed self diffusion at grain boundaries and points of crystal defects. A self diffusion theory of secondary creep is proposed embracing the principles of the Dushman-Langmuir theory of solid diffusion. The author suggests an equation whereby the rate of tensile creep may be related directly to the physical and structural character of the solid metal.

Effect of Chromium on the Grain Growth of Brass by *B. W. Gonser* and *C. M. Heath* of the Battelle Memorial Institute. Small amounts of chromium added to 70:30 brass are exceptionally effective in retarding grain growth even at 850 deg. C. Only about 0.05 to 0.06% chromium is needed to give a grain size of less than 0.02 mm. to brass, annealed at or below 550 deg. C., about 0.10% holds the grain size below 0.04 mm. when annealing at temperatures up to 750 deg. C. and 0.17% chromium is satisfactory for restraining grain growth at 850 deg. C. Brass containing chromium does not exhibit an erratic annealing behavior as has been observed with iron. A slight decrease in ductility may be experienced but a higher strength as well as small grain size is obtained. This property of brass containing chromium is valuable not only for rapid annealing work but also when brass articles must be heated to high temperatures, as in brazing. Where deep drawing is involved, the desired grain size can be more readily achieved.

Dr. D. K. CRAMPTON
Author of a paper on The Spot Welding Characteristics of Some Copper-Base Alloys (see p. 550).

Lead-Magnesium Alloys for the Prevention of Lead Poisoning in Water Fowl, by *R. L. Dowdell* and *R. G. Green* of the University of Minnesota. Hunters spray marshes with lead pellets; wild fowl pick these up and eat them. Lead poisoning, frequently fatal, ensues. The authors have found that lead shot containing preferably 1.5% magnesium disintegrate in the gizzard of the fowl and are passed off quickly without producing serious effects. Shot of this composition cannot be made by the usual shot-tower method but can be rolled to accurate sizes from segments cut from wire.

Age-Hardening of Aluminum Alloys. III—Double Aging Peaks, by *William L. Fink* and *Dana W. Smith* of the Aluminum Research Laboratories. The authors do not agree with certain previous investigators who have ascribed initial peaks in the hardness curves to pre-precipitation phenomena. This paper describes the preparation and treatment of aluminum alloys containing approximately 4% copper. From the microscopic examination of these alloys it was found that where double-aging peaks were detected the microstructures showed preferential precipitation along slip bands. It was concluded that the first peak in the aging curves of these alloys could be explained most simply by the more rapid precipitation in the regions that had experienced plastic deformation during quenching. Later softening might be due to overaging in these same regions while further hardening was accompanied by more general precipitation.

Effect of Tellurium on Mechanical Properties of Certain Copper-Base Alloys by *H. L. Burghoff* and *D. E. Lawson* of the Chase Brass & Copper Co., Inc. This paper describes experimental work on the effect of tellurium in three alloys (1) 90 copper, 10 zinc (2) 98.5 copper, 1.5 tin (3) 96 copper, 3 silicon, 1 zinc. In all three cases it was found that the addition of tellurium noticeably improved the machinability at some sacrifice of toughness and ductility but without affecting hardness or strength. The improvement was most pronounced in the 1.5% tin bronze, where the optimum content of tellurium was about 0.5%.

Additional papers included the following:

Some Fundamentals Concerning Impact Testing, by *Earl B. Smith*, College of the City of New York.

Sulphur, Selenium and Tellurium in Copper-Base Alloys, by *Cyril S. Smith*, American Brass Co.

Building Up Locomotive Driving Boxes

By Irving T. Bennett, Revere Copper & Brass, Inc.

Locomotive driving boxes require bronze linings to accommodate the driving wheels during occasional misalignment, as in rounding a curve. In the past it was customary to produce this lining by casting bronze on the face of the driving box, a method which gave a good deal of trouble. Much better results are now obtained by welding on a bronze lining, using an electrode containing 96% copper, 3½% silicon, ½% tin. A welding current of 650 amperes is employed with a ½ inch round electrode, covered with a fluxing material to protect the bronze from burning. The molten bronze alloys to some extent with the iron to form a firm bond. New boxes are lined in about forty minutes. The old style cast linings required renewal about every 30,000 miles, whereas the new built-up linings have a life up to 120,000 miles. Nearly $100 per locomotive is saved. In repair work similar savings have been made with other locomotive parts.

Wire Manufacturing

The Wire Association program included the following papers of interest.

A Metallurgical Study of the Factors Affecting the Quality of Galvanizing

By R. W. Sandelin, Atlantic Steel Co.

In the hot-dipping process, zinc coatings are subject to the influence of a number of factors which influence the quality and surface appearance. Gray spots which affect the uniform appearance of the "spangle" are a frequent cause of rejection. As the result of a comprehensive study the author concludes that spotted areas consist of iron-zinc alloy without the usual top layer of bright zinc, which has diffused into the iron. This is characteristic of certain heats or grades of steel which may be identified in advance according to their method of manufacture. Acid pickling to remove scale does not cause spotting on a suitable steel but does intensify the effect on unsuitable steels. Although the trade is apt to depend upon the appearance of a galvanized article this is not actually a true measure of its quality for service.

The exhibit of metal manufacturing equipment and supplies held

Welding Program

A number of papers presented before the American Welding Society are of interest.

The Spot Welding Characteristics of Some Copper-Base Alloys

By D. K. Crampton and *J. J. Vreeland, Chase Brass & Copper Co.*

Spot welded brass, phosphor bronze and similar alloys are widely used in tanks, containers, architectural assemblies, and corrosion-resisting structural numbers. The authors made an experimental investigation of the factors involved in the quality of the welded joint. A torsion test was developed which proved to be a marked improvement over the ripping test commonly used for determining the quality of spot welds. A hydrostatic test provided excellent supplementary information. It was found that the most efficient welding conditions, such as electrode pressure and power consumption, varied widely from alloy to alloy. The most important factor welded. The addition of silicon and manganese to copper alloys is advantageous in raising the contact resistance and lowering the power consumption. Once the contact resistance has been measured accurately, the best welding conditions for any given alloy may be predicted but much work remains to be done before the subject is thoroughly understood.

The Welding of Copper

By Professor A. P. Young, Michigan College of Mining and Technology

Within the past five years it has become possible to weld copper successfully on a commercial basis. Hundreds of million of dollars worth of welded copper are now in use in the form of stills, tanks, brewing vats and similar equipment. Two processes are in use, the long carbon-arc process and the oxyacetylene process. In the latter a flux is essential. In the carbon-arc process, which is six times faster than the oxyacetylene process, the arc must be about one inch long. By either method, satisfactory welds are produced, free from the oxide contamination which was formerly troublesome. A fundamental difficulty exists in the fact that when copper, which has been hardened by cold work, is welded by either process, the welding heat softens the copper in the zones near the weld. This reduces the strength of the assembly and is apparently an insuperable difficulty.

in the Auditorium, Atlantic City, N. J., October 18-23, 1937

A. C. Electro-Pickling: A Better Method of Pickling

By Allan B. Dove, Steel Company of Canada, Ltd.

Dealing principally with steel the author describes the use of an electro-cleaning process which makes use of an organic inhibitor. Rods so treated may be copper-coated for drawing purposes. Rubber and brick-lined steel tubs are recommended with monel for carrying hooks and steam lines, in preference to other stainless alloys, copper, brass or lead.

The Manufacture of Fourdrinier Wires

By Hugh E. Brown, W. S. Tyler Co.

The Fourdrinier wire is an endless belt of fine mesh used as a conveying medium during the dewatering of paper pulp. It is usually made from brasses and bronzes. Methods of manufacturing and testing are described, together with the physical and chemical properties necessary to a satisfactory product. Better alloys are needed.

The Need of a Better Quality of Copper in Apparatus Manufacture

By L. H. Burnham, General Electric Co.

The author discusses imperfections in copper wire, rod and other products and the effect of such imperfections on their electrical use. There is need for hot-rolled rod from which a better quality of wire can be manufactured.

Production of Copper from Mine to Mill

By Wm. H. Bassett, Jr., Anaconda Wire & Cable Co.

Present day copper is of the highest quality ever produced for electrical purposes. A one-inch diameter rod, rolled from standard electrolytic wire bar, can be drawn without annealing to a diameter of 0.002 inch, thereby increasing the length of the original rod from one foot to forty-seven miles. In order to meet various requirements the up-to-date rod mill carries in stock six classes of wire bar: (1) Fire-refined Lake copper, (2) standard electrolytic copper, (3) scalped electrolytic copper, (4) end-poured electrolytic copper, (5) deoxidized copper, (6) oxygen-free copper.

Notes on the Annealing of Nickel Silver Wire in Coils

By Thurston C. Merriman, Seymour Manufacturing Co.

Various types of electrically heated and fuel-fired furnaces are discussed, and difficulties to be avoided are enumerated. The leaded alloys require particular care because excessive time or temperature tend to produce segregation of the lead while too rapid heating is likely to cause fire-cracking.

Nickel and Nickel Base Alloys in Wire and Rod Products

By Carl Rolle, International Nickel Co.

This paper is a study of the corrosion resisting properties of nickel and its alloys in the form of wire and rod, together with an outline of the essential working characteristics required for their satisfactory manufacture. The alloys discussed are: (1) monel, regular type, (2) "R" monel, free machining types, (3) "K" monel, heat treatable type, (4) nickel, regular type, (5) "Z" nickel, heat treatable type, (6) inconel, nickel-chrome-iron alloy. Monel, including the special types, is resistant to mineral and organic acids, alkalies, and salts over a wide range of concentrations and exposure conditions. Nickel, including the "Z" type, is slightly superior to monel in resisting alkalies, about the same with respect to salts, inferior to monel in resistance to acids. Inconel was developed primarily to resist corrosion and tarnishing by foods. It is also superior to monel and nickel in resisting strongly oxidizing acids and dilute organic acids.

Dr. C. B. F. YOUNG
Author of a paper on Metal Coloring

Society for Metals Papers

Among the papers read before the American Society for Metals were:

Solubility of Copper in the Grain-Boundary Material of a Solid Solution of Copper in Zinc, by *G. R. Dean* and *W. P. Davey*.

A technique has been developed for obtaining, in a form suitable for spectrographic chemical analysis, specimens of material representing primarily crystal-boundary material which may be compared with other specimens of material from the body of the crystals themselves. Specialized equipment, developed for this purpose, has been shown by means of diagrams.

By spectrographic chemical analysis it has been shown that the concentration of solute in a solid solution is different at the intercrystalline boundaries than it is in the body of the crystals.

It has been shown specifically that Cu is more soluble in the body of the crystals of solid solutions of Cu in Zn than in the intercrystalline boundaries of those same solid solutions.

Metal Coloring, by *C. B. F. Young*.

Chemical solutions are given for coloring aluminum, brass, cadmium, chromium, copper, iron, magnesium, silver, tin, and zinc.

Electrochemical processes are given for coloring aluminum, chromium, magnesium, nickel, cobalt, and tin.

A very interesting black coating has been developed for magnesium and tin. This is produced in a chromic acid-trisodium phosphate solution using fifteen to thirty amperes per square foot. The process holds promise for coloring other metals but is unsuccessful when applied to iron and zinc.

An alloy deposit consisting of cobalt and nickel is proving to be of commercial importance as the coating produced is whiter than nickel and has better corrosive resisting properties. The color approaches that of pure silver.

The need for systematic research is very great. Some encouragement should be given by industrial concerns and scientific societies to those interested in this particular field. Very little has been done and much remains to be discovered. The future in this field looks very bright due to the fact that the public is demanding metallic products be finished in attractive designs.

The Exhibit of Equipment and Supplies

As always, the spectacular feature of the National Metal Congress was the exhibit of metal manufacturing, equipment and supplies. This year the exhibit was one of the largest in the history of the Congress. A total of 237 firms displayed their products covering every phase of the metal manufacturing industry. Among the specialized operations of particular interest to readers of METAL INDUSTRY, were the following:

Metal melting
Heat treatment and annealing
Sand blasting (blast cleaning)
Welding
Brazing and soldering
Grinding and polishing
Metal cleaning
Electroplating
Lacquering and enameling
Metal spraying
Hot dip coating
Temperature measuring controlling and recording

Among the firms which displayed exhibits of outstanding interest in these classes of work were the following:

Ajax Electric Company, Philadelphia, Pa. Electric heat treating and annealing furnaces.

Aluminum Co. of America, Pittsburgh, Pa. Aluminum alloys in many types in sheet, rod, wire, tube and castings in varied finishes.

American Brass Co., Waterbury, Conn. Copper base alloys including Everdur, Beryllium copper, Ambraloy, Tobin Bronze, phosphor bronzes, Super-Nickel, condenser tubes, bronze welding rods, sheet, rod, wire and tube.

American Cyanamid & Chemicals Corp., New York. Chemicals for heat treating and metal finishing processes.

American Foundry Equipment Co., Mishawaka, Ind. Blast cleaning equipment—the "Wheelabrator".

American Gas Furnace Co., Elizabeth, N. J. Heat treating furnaces; aluminum melting furnaces.

American Institute of Mining & Metallurgical Engineers. Historical exhibit showing development of metal recovery and manufacturing processes; aluminum coating of steel by the hot dip (Fink) process.

Ampco Metal, Inc., Milwaukee, Wis. Ampco metal alloy of copper, aluminum and iron in sand castings, centrifugal castings, rolled and formed material.

Arcos Corporation, Philadelphia, Pa. Special features for welding nonferrous products.

Armstrong Cork Products Co., Lancaster, Pa. Refractories, refractory products, etc.

Automatic Gasflux, Inc., Cleveland, Ohio. New flux for bronze welding.

Bellis Heat Treating Co., Branford, Conn. Electric furnace for heat treating.

A somewhat strange gentleman in the seat of a roadster with his attention divided between two steering wheels provided an element of mystery to attract convention-attenders to the Harnischfeger booth.

Blakeslee & Co., G.S., Chicago, Ill. Degreasers for treating metal products before finishing; spiral drying machine (see METAL INDUSTRY, October, 1937, p. 519).

Botfield Refractories Co., Philadelphia, Pa. Refractories for metal melting and heat treating furaces.

Bristol Co., Waterbury, Conn. Pyrometers, recorders and controllers.

Brown Instrument Co., Philadelphia, Pa. Pyrometers, potentiometer temperature recorders.

Carborundum Co., Niagara Falls, N. Y. Abrasives and refractory products.

Crown Rheostat & Supply Co., Chicago, Ill. Plating barrels, dryers, polishing lathes, rheostats and nickel anodes.

Despatch Oven Co., Minneapolis, Minn. Ovens for baking industrial finishes and other automatic soldering and brazing.

Detroit Rex Products Co., Detroit, Mich. Degreasers for treating metal products before plating and finishing.

Divine Brothers Co., Utica, N. Y. Abrasive wheel heading machine; buffs.

Dixon Crucible Co., Joseph, Jersey City, N. J. Graphite and graphite products for metal melting and heat treating equipment.

Dow Chemical Co., Midland, Mich. Dowmetal die castings as made by Doehler Mfg. Co., Toledo, Ohio.

E. I. duPont de Nemours & Co., Wilmington, Del. (*Grasselli Chemicals Dept.*, Cleveland, Ohio; *R & H Chemicals Dept.*, New York). Chemicals for all types of electroplating. Zin-O-Lyte and duPont bright zinc plating processes. A semi-commercial plating installation in actual operation.

Electric Furnace Co., Salem, Ohio. Furnaces for special atmosphere equipment; copper brazing; scale-free heat treating and bright annealing.

Electro Refractories & Alloys Corp., Buffalo, N. Y. Refractories for metal melting and heat treating furnaces.

Ford Sales Co., J. B., Wyandotte, Mich. Specialized metal cleaners for subsequent plating, lacquering and all types of metal finishes, rust-proofing, hot tinning, etc.

Foxboro Co., Foxboro, Mass. recording and controlling instruments for temperature, pressure, etc.

General Electric Co., Schenectady, N. Y. Electric furnace equipment for arc welding, bright annealing, etc.; industrial x-ray equipment.

The Gehnrich Corp., Long Island City, N. Y. Ovens for core baking and for baking industrial finishes on metal products.

Handy and Harman, New York. Soldering and brazing materials and fluxes; "Easy-Flo" and "Sil-Fos" alloys. Samples of silver and other work and other metal products, soldered and brazed at the booth.

Harnischfeger Corporation, Milwaukee, Wis. Electric welders; welding electrodes.

Haynes Stellite Co., New York. Cutting tools for machining all metals; corrosion resistant alloys.

Hauck Mfg. Co., Brooklyn, N. Y. Burners, valves and other accessories for oil, gas, fuel for metal melting and heat treating furnaces.

Hevi-Duty Electric Co., Milwaukee, Wis. Heat treating furnaces.

Hobart Brothers Co., Troy, Ohio. Arc welders.

Houghton & Co., E. F., Philadelphia, Pa. Metal cleaners, rust preventives.

Illinois Testing Laboratories, Inc., Chicago, Ill. Pyrometers; thermometers; pyrometer controllers.

International Nickel Co., Inc., New York. Nickel alloys of all types including nickel bronzes, Monel metal, etc. Samples of interesting nickel plated work, such as bright nickel; fine mesh screens made directly by electro-deposition; a chart of various types and thicknesses of electroplates, showing graphically the value of platings to sufficient thickness.

Leeds and Northrup Co., Philadelphia, Pa. Temperature measuring equipment, temperature recording and controlling equipment.

Linde Air Products Co., New York. Oxy-acetylene welding and cutting equipment.

Maas & Waldstein Co., Newark, N. J. Lacquers, enamels and synthetic finishes of all types for metal products.

Macklin Co., Jackson, Mich. Grinding wheels.

Manhattan-Rubber Mfg. Div., Raybestos-Manhattan Co., Passaic, N. J. Rubber bonded grinding and polishing wheels.

Metal Coating Co. of America, Philadelphia, Pa. Metal spraying through the Metalayer spray gun.

New Jersey Zinc Co., New York. Zinc die castings, raw, finished and assembled. Unusual castings. A phonograph record played on the Wurlitzer machine describing the importance of zinc base die castings in the construction of this machine.

Norton Co., Worcester, Mass. Abrasives and abrasive wheels of all imaginable types for grinding and polishing all metals.

Pangborn Corp., Hagerstown, Md. Sand blasting, blast cleaning equipment.

Park Chemical Co., Detroit, Mich. Polishing and buffing materials for steels and plated work; grain cement for setting up polishing wheels.

Partlow Corp., New Hartford, N. Y. Gas heat treating furnaces.

Philadelphia Drying Machine Co., Philadelphia, Pa. Drying machines; melting furnaces; heat treating furnaces.

Production Machine Co., Greenfield, Mass. Automatic sanding, polishing, finishing and buffing machines for tubes, rods, bars, flat work, special shapes, etc.

Pyrometer Instrument Co., New York. A variety of pyrometers including the new Bi-Optical and the Remote pyrometer.

Quigley Co., Inc., New York. Refractory cements.

Seventy-one zinc alloy die castings in a single model coin-operated Wurlitzer automatic phonograph.

Riverside Metal Co., Riverside (Burlington Co.), N. J. Beryllium copper in a variety of forms; phosphor bronze, nickel silver.

Roxalin Flexible Lacquer Co., Inc., Elizabeth, N. J. Over 200 samples of industrial finishes shown in their Trail Blazer (a 22-ft. trailer) for finishing all varieties of metal products.

Scherr Co., George, New York. Microscopes for metal grain size determination.

Surface Combustion Co., Toledo, Ohio. Heat treating and annealing furnaces.

Tagliabue Mfg. Co., C. J., Brooklyn, N. Y. Indicating, recording and controlling instruments for temperature; potentiometer pyrometer; industrial and chemical thermometers.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y. Samples of titanium alloys and zircon refractories; titanium treated aluminum.

Westinghouse Electric & Mfg. Co., E. Pittsburgh, Pa. Arc welding equipment.

Gold Solution

Q.—Will you please let us know why our gold does not come out right. This is way we make it.

Gold ribbon twisted put in.

½ acid hydrochloric
¼ nitric
Boiled down.

Then we put in a glass of water and one glass ammonia, fill up with water and let settle; put water in pot and put in 6 cyanide balls, a handful of sodium phosphate, then we draw off water.

Is there anything we put in that should not be put in or don't we use right chemicals?

A.—The method described is not entirely clear but after precipitating the gold as fulminated with ammonia, the precipitate should be washed. This is done by allowing the precipitate to settle and then drawing off the clear liquid. More water is added to the precipitate. Allow to settle and draw off the water. This is repeated until the wash water shows no trace of ammonia. The precipitate is then taken up with the desired amount of cyanide.

A gold solution can be made up as described on page 19 of the Platers Guidebook, 1937 edition, published by the METAL INDUSTRY. This calls for:

Sodium gold cyanide	½ oz.
Sodium cyanide	½ to 1 oz.
Disodium phosphate	2 ozs.
Water to make	1 gal.

The use of the sodium gold cyanide salt is recommended as being more convenient and a more reliable method of obtaining the desired gold content, as against the dissolving of gold in aqua regia with subsequent precipitation, washing, etc.

—G. B. HOGABOOM, JR.

Methods of Joining Copper Alloy Products. Part 3: Tubes, etc.

Welding methods have become vitally necessary (a) as an element in facilitating design, (b) as en economical manufacturing method, (c) as an aid to good service performance and (d) as a convenient means of making repairs. Examples are taken and analyzed to help the designer, shop superintendent and welding operator to a better understanding of the problems involved.*

By I. T. HOOK

Research Engineer, The American Brass Company, Waterbury, Connecticut

Relative Expansion Steel and Copper

Figure 7 (b)[1] illustrates another problem for which the designer must always plan. We have steel and copper bronze-welded securely together. On a change in temperature the copper will expand or contract faster than steel. Radial and longitudinal strains are nullified by the 90° angle so that the only serious strains will be those along the 66″ of the circumference. From the welding temperature, the copper will want to shrink more than the steel. Hence weld 1 will be put in tension and weld 2 in shear, the steel in compression and the copper in tension. The copper being dead soft from the welding heat will yield if the tension reaches 3500 pounds per square inch. Hence it is not serious and can be dissipated anyway by a light peening and in machining the flange. On being reheated under service conditions, the copper will be put in compression and the steel ring in tension which should not be serious to either metal while the welds will be practically unaffected.

Longitudinal Weld

The weld illustrated in Figure 7 (c)[1] is a section of one of the two longitudinal welds in the 24″ diameter shell which carries the heater tubes. It would of course have been possible to make a fusion weld with the oxy-acetylene torch and deoxidized copper welding rod but this would have meant much more distortion due to the wider spread of heat in the base metal and would have called for a free weld with the difficulties attendant thereon to properly match the edges. The Tobin bronze weld was ruled out on account of the requirement that only copper should be presented to the contents of the apparatus.

The use of Anaconda 310 phosphor bronze welding rod, applied by the long carbon arc, meant that the half cylinders could be exactly matched, clamped to a grooved copper backer and tacked rigidly together. With the proper heat setting, the weld is then run at a speed between 10 and 20 inches per minute. In this case, for the ¼″ thick base metal, the weld was run in two passes.

The Long Carbon Arc

Several things are important in this method of welding.

(1) Since the heat is to be so intense for long arc welding and the weld must proceed so fast, it is essential that the work be closely clamped against a grooved copper backer. The copper backer need not be heavy. Usually a copper insert made of ½″ x 1″ copper set into a steel or cast iron jig will be sufficient. The groove in the copper backer will depend upon the work but generally it will be 1/32 to 1/16″ deep x ½ to ¼″ wide.

(2) The Anaconda 310 phosphor bronze welding rod used with this method of welding is a high tin, high phosphorus bronze. If a short arc is used, the phosphorus is evaporated from the highly superheated metal in the arc crater leaving the tin and copper exposed to oxidation with the result that the metal is porous and weak. With a given current, a long arc furnishes a higher total heat (since the heat energy of an arc is proportional to the product of volts times amperes) than a short arc. It spreads over a wider area with an actual decrease in the temperature of the molten metal. The base metal is brought up to the welding temperature simultaneously with the melting of the welding rod and the weld proceeds rapidly and economically. Just what is a "long arc"? In general, it is an arc corresponding to an arc voltage between 35 and 60. This means an arc length of ⅝″ to 1½″.

(3) The third essential, i.e. a high welding speed along the seam, is desirable from the consideration of the weld metal which is sounder if it is melted and solidified rapidly and it is a major requirement if the base metal is oxygen-bearing copper but not so essential if the base metal is deoxidized copper. In the case of the former, a slow welding speed of say less than 5″ per minute allows time for the cuprous oxide to collect at the grain boundaries developing thereby a zone of weakness. With a higher welding speed of 10″ or more per minute this reaction takes place to a much less harmful degree. With deoxidized copper base metal, there is, of course, no cuprous oxide to create the particular weakness described above.

(4) A fourth essential which applies to the weld of Figure 7 (c)[1] and indeed to all welds, gas or arc, made in two or more passes, is that the second or any pass other than the first *must not start from the end of the*

* Parts 1 and 2 were published in our Sept. and Oct. issues.—Ed.

[1] See Metal Industry, October, 1937, page 501.

seam. It must start from some point remote from the edge proceed to one edge and then to the other edge from the same starting point. Or it can be made in back steps always finishing and never starting at the edge.

The reason for this requirement is that if the second pass is started at the edge proceeding inwards, the welding heat will cause expansion in the base metal when it is centered some short distance in from the edge. This will cause tension in the metal at the edge while it is still hot from recent solidification and, if it be at all inclined to hot shortness, it will open up scissorwise, the crack continuing for some distance—frequently for several inches. All of the phosphor bronzes have a short temperature range in which they are hot short. The same is true of the copper nickel alloys and the copper silicon alloys.

When the weld is started at some point remote from the edge, the expansion of the base metal against the more rigid outlying areas causes compression on the recently solidified metal, avoiding thereby hot short cracks.

Connections, Tubes to Headers

Another problem that confronts the designer of copper and copper alloy equipment is that of making a tight connection, tubes to headers, in the manufacture of a great variety of heaters, economizers, condensers, evaporators, radiators and other types of heat exchangers.

In many steam condensers where the tubes are of admirality, aluminum brass or red brass and the header is a relatively thick plate of Muntz or Manganese brass, a mechanically rolled-in tube connection is satisfactory. On the other hand, there are many varieties of heat exchangers in which a thick header is undesirable and some form of a soldered or welded connection of the thin tubes to the thin header must be used. Again, modern refrigeration and air conditioning has brought into use refrigerants which are very penetrating and relatively expensive. A rolled-in connection for such is unsatisfactory and a hermetically sealed connection imperative.

Figure 8 indicates several types of connections in which there is a metal to metal seal. In (a) and (b) Figure 8 are shown typical soft-soldered types of joints. The low creep strength of soft solder requires a considerable area of bonded surface. Hence, when a thin header is used, it is necessary to draw out the metal around each tube hole to form a cylindrical neck to fit the tube closely. In (a) this is done outwardly and the tubes are soldered from the inside before the header is closed. Figure 8 (b) shows a typical arrangement when the header is a closed tube. The soldering in this case must be done from the outside.

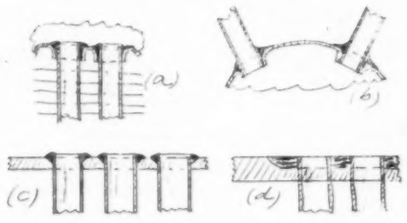

Fig. 8. Connections, copper alloy tubes to thin copper alloy headers

In cases where soft solder lacks the requisite strength, one of the silver solder from Table 3[2] may be used. Thus solder from Table 3 may be used. Thus in equipment designed for more than one or two atmospheres pressure or for a temperature greater than 180°F, the hard solder will be preferred on account of its greater strength and higher factor of safety. As in the case of copper tubing mentioned above, the use of anything except soft solder will result in an annealed base metal.

Owing to the cost of silver solders and rather low ductility of other types of hard solders, brazing or bronze welding is often preferred even though the temperature of application may be as high as 1600 to 1650°F. Figure 8 (c) and (d) illustrate this type of connection. In Figure 8 (c) the tube holes in the header, which is usually 5/32″ to ¼″ in thickness, are countersunk on a 45° bevel.

The assembly header and tubes, properly fluxed, are heated usually by a large torch and the bronze flowed into place when their temperature reaches the flow point of the bronze. For a bronze of the Tobin Bronze type, a temperature should approximate 1630°F. Figure 8 (c) shows a similar assembly except that the tubes project through the surface of the header—which is frequently machined to make a depressed area for the bronze, the tubes coming through to the level of the header rim.

[2] See Metal Industry, October, 1937, page 498.

The procedure for the bronze welding operation calls for considerable heat. In some cases where the original copper header thickness, Figure 8 (d), is of the order of ½″, charcoal is used for preheating. In other cases a torch of city gas and compressed air could be used for preheating and oxy-acetylene for actually melting and placing the bronze.

There is one hazard against which the operator must guard, i.e. the burning of the tubes which are invariably rather thin-walled. If the intensely hot blast of the oxy-acetylene torch be allowed to enter the tube end, it will most likely overheat the tube if it does not actually melt through the thin wall. To prevent this source of trouble, several means are in use:—(a) occasionally the tube bundle is set into a tank of water, the level of the latter coming to within about 4″ of the joint to be brazed. (b) Another method is to drop tapered carbon plugs into the ends of the tubes which will keep the blast from entering the tube. Metal plugs supported from above can not be used as they would interfere or be likely to become bronze welded into place but (c) copper rods can be run into the tubes from the bottom to within about 2″ of the joint. In methods (a) and (c) the tube end is left open but no great amount of burning gas enters on account of the lack of flue action.

Fusion welds connecting the tube ends to the header are possible but are rarely resorted to when there are a large number of small tubes on account of the high degree of skill required and the high labor costs. Fusion welds are frequently made where a single large tube as for instance a flue tube is to be connected to a header. Such welds are discussed under carbon arc welding of copper etc.

Where the temperatures are rather low, as for instance in some types of air conditioning condensers, relatively thick copper-alloy tube sheets with rolled-in tubes sealed with one of the soft solders of Table 2 may be used. A Muntz metal would probably be used in this case on account of its anodic relation to copper tubes, its relatively good hardness and facility with which it takes soft solder.

This article will be continued in an early issue.—Ed.

Zinc in Commercial Impact Extrusion

Speed, economy and operating advantages in the manufacture of special shapes.

By W. W. PFLUG
General Extrusion Corporation, Hillside, N. J.

TODAY, slugs punched from high-purity zinc stock are being extruded successfully, and on a large commercial scale, in the plant of the General Extrusion Corporation, Hillside, N. J. The products turned out include, among others, many forms employed in electrical applications, those in the radio field being most important to date. Although the extrusion of zinc is not a strictly new departure, it is done at this plant on a more extensive scale than elsewhere. And here zinc is extruded for a large variety of products for numerous customers.

Peculiarities and Advantages of Impact Extrusion

In a general way, the process is similar to that long employed in extruding parts from aluminum and tin, but the material used is somewhat less expensive than either aluminum or tin under the usual conditions of the metal market, and for certain purposes has various other advantages. These include greater ease of soldering—an important consideration in some electrical applications—and less tendency toward resonance. The latter is a factor in parts such as vibrators for radio use, especially in automotive sets, where silence in operation is essential.

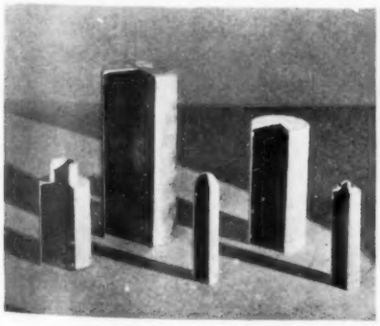

Fig. 1. Zinc parts produced by impact extrusion, cut away to show the variation in section thickness and shape—a characteristic of many such parts not possible to duplicate by drawing

As compared to tin, much used in extruding tubes for pastes and creams of various types, zinc is much lower in cost and is also stronger physically. There are also certain differences between zinc and aluminum, the latter having a brighter luster and holding it longer, but being attacked by certain alkalies which zinc resists. Zinc is required, of course, for dry cell "cans" and for certain electrolytic condensers, both of which are often provided with cases formed by extrusion.

Equipment Required

The process of extrusion is performed in specially designed presses fitted with a punch and die somewhat like those employed in drawing operations, but differing in important respects. Instead of using a blank of sheet metal, as in drawing, the blank is a slug previously stamped from a special grade of high-purity zinc. This slug is placed in the die cavity, being slightly smaller in diameter than the latter, and is struck an impact blow by the punch. The impact causes the zinc to flow, first filling the die cavity and then extruding between the punch and the die opening to form the side walls of the extruded part. The latter is formed in this one operation, and so rapidly that the eye cannot follow the metal. As the punch is withdrawn, the extruded part comes away from the die with the punch and is stripped, much as in drawing.

Special Shapes Produced

Clearly, the extrusion process is quite different from drawing although the same products are sometimes produced by both methods. It is possible to extrude certain types of parts which cannot be drawn, however, and the process is used chiefly for such parts. An important difference between drawn and extruded parts is that the former are substantially uniform in thickness throughout, whereas the extruded part often has a bottom considerably heavier than the side walls. In addition, the extruded product may have on the bottom integral lugs, either solid or hollow, and if desired, these may be offset by as much as half — or even somewhat more than half—the radius of the piece.

When required, a central hole may be formed in the projection if the latter is co-axial with the piece, the walls around the hole being of any desired thickness and subsequently tapped or threaded externally if required. It is necessary, of course, to use a slug having approximately the same volume of metal as the finished part, or a little more than the same volume, to allow for flash at the top of the tubular part, as is common. Slugs may have a height equal to but not exceeding their diameter and this may limit, in some cases, the total height of tubular extension formed in the extrusion, but in general this process is limited more by physical dimensions of the presses, particularly in larger diameters.

In a sense, the process may be regarded as intermediate between

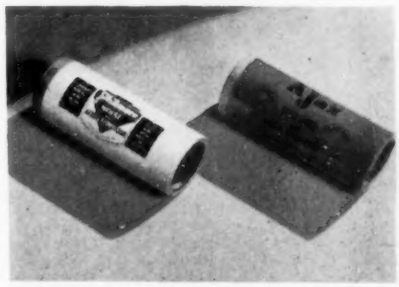

Fig. 2. Impact-extruded zinc parts, finished and branded by special machines which apply colors by an offset printing process, often including lettering, trade-marks and the like

drawing and forging, but the finish of the part is bright initially, and comparable in smoothness to that of drawn parts. Integrally-formed lugs are an important consideration in many parts, as they often serve as a means for attaching the extruded element to some supporting part. As the zinc is quite ductile, the lug can be headed over or expanded by striking it after fitting it through a stamped bracket. If the lug is of square section and is fitted in a mating hole, the part is prevented from turning about the lug. Lugs are sometimes threaded for screwing into mating parts, or to receive a nut or screw as a fastening means. Threads are readily cut, but require a separate operation, of course.

Bottoms of extruded parts may be flat or conical, may be tapered or of uniform section, may have fillets or square corners and may have the same or a different thickness from side walls. Tolerances on bottom thickness dimensions are usually plus or minus 0.007 in. Side walls may have a thickness of 0.020 in. upward in 2⅛ in. diameters and about 0.014 in. minimum on small diameters down to 0.437 in., the smallest yet made. The usual tolerance on side wall thickness is plus or minus 0.003 in. For the smallest size about 2.5 in. is the maximum height of side wall feasible, but in the 2⅛ in. diameter—the largest yet produced—a height of 8 in. has been achieved. An allowance is commonly made for trimming the top edge to give the desired height, since the height as extruded is not uniform.

Although the extrusion process work-hardens the zinc, it still remains ductile and may be formed in various ways. An operation commonly performed is that of rolling a bead inwardly near the top to serve as a stop for a closure disk, the part above the closure being spun or rolled in later to seal the disk in place. Spiral other other fluting may be rolled into side walls which may be pierced, or holes may be punched in the bottom, if required, for taking out leads or for other purposes.

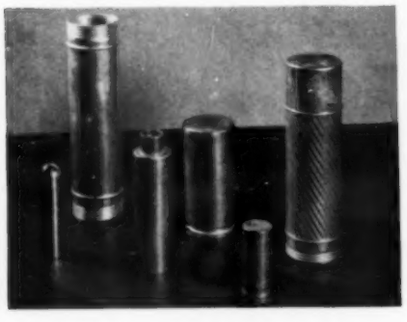

Fig. 3. Illustrates the production of parts with lugs, bosses and rolled theads

Finishing the Extruded Parts

Lettering, trade marks and the like can be rolled easily into side walls, using either raised or embossed lettering, and this procedure is often followed. If a plated finish is desired it is readily provided after buffing and cleaning, much as in plating other zinc parts, but no finish is necessary on parts not exposed to view unless conditions are unusual, as the zinc is non-rusting, of course, and is seldom subject to corrosion beyond tarnishing. Decorative finishes such as lacquers and enamels, are readily applied, following a suitable cleaning, and preferably after one of the commercial chemical treatments designed to promote adherence of subsequent coats.

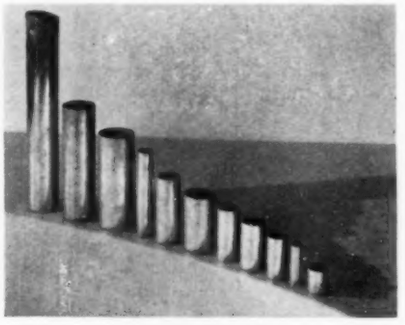

Fig. 4. Range of sizes obtainable

In the General Extrusion plant, a special type of finishing applied by an offset printing process has been developed, and when this is employed the extruded part may be prepared with a finish in two or more colors and with printing, trade marks and embellishments of various kinds. This is a rapid process, relatively inexpensive, and often adds a great deal to general appearance. It is applied to the cylindrical surface by a special machine developed for the purpose.

Accompanying illustrations show a variety of different products extruded in zinc, some of them being cut away so that the variation in section thickness may be seen. All the operations required, including the extrusion itself and subsequent forming, trimming, threading and branding as well as finishing were done in the plant above mentioned. The parts produced to date include cans for electrolytic condensers, vibrators and batteries, shields for other radio uses, flashlight cases, and some cans for packaging. So-called "noise filters" and "aerial eliminators"—open-end tubes for use in radio circuits—finished in colors with labels are also produced for companies marketing parts for amateur radio sets.

Soldering Dissimilar Metals

Q.—What method, solder, and flux would you employ to soft solder nickel silver parts to forged stainless steel parts.

A.—The uniting of dissimilar metals by welding or soldering is always a problem. From the standpoint of stainless steel, its soldering to the nickel silver would require a stainless solder that has been carefully compounded. On the other hand, some of the silver solders have been developed that might be good for this work. These solders are clean, rapid and economical as they run very freely.

A flux suitable for stainless steel is available from supply houses. However, the following compound is recommended by some of the makers of the steel: 36 parts ferric chloride, 2 parts nitric acid; 62 parts hydrochloric acid.

As this flux is strongly acid, in order for it to act on the stainless steel, it follows that a most thorough washing must be given the soldered parts.

Possibly the flooding in an alkaline solution followed by a clean water washing would be safer. Some recommend adding cuttings of zinc sheet to the flux solution but no reason is given for this queer combination for stainless steel.

—W. B. Francis.

A Study of the Rochelle Salt-Copper Plating Bath

Part I. The pH characteristics of this type of bath.

By **Dr. A. KENNETH GRAHAM**[1] **and HAROLD J. READ**[2]

Introduction

THE value of the Rochelle salt-copper bath has been stressed in recent months, but the varied success that has been reported by users of this bath suggests that there is much that is unexplained concerning it. Its rapid plating characteristics are admitted. Disagreement exists, however, regarding other points. Some recommend a pH of 11.3, others 11.5 to 12.5 and still others fail to measure or control pH. Furthermore, some claim that iron is attacked by the bath with resultant plating difficulties. Others report having operated in unlined steel tanks for long periods of time with no unusual accumulation of iron in the bath. Iron containers for ball anodes have been known to suffer attack. Anodes have been known to polarize so badly as to cause shutdowns until they can be removed from the bath and cleaned. Caustic soda has been added in such cases with some reduction in the tendency for anodes to polarize. Other points of disagreement involve the presence or absence of carbonates in the bath, the effect of carbonates, the operating temperature and the quality of the deposits. The Rochelle salt copper bath is therefore a timely subject for research.

Springer, Coates and Heussner have mentioned the importance of pH in certain applications of alkaline plating baths. The plating industry is also indebted to Mr. G. B. Hogaboom for the striking manner in which he emphasized the effect of pH in his prize winning paper at the last American Electro-Platers' Society convention. It is fair to state that the effect of pH in alkaline baths is interesting a far greater number of investigators since the convention in June of this year. In the light of this it is natural to suspect the pH of the Rochelle salt-copper bath as being an important factor in its performance. Therefore, the pH characteristics of the bath and of its several constituents were first studied. The results are reported as Part I of this paper.

All pH measurements were made by the colorimetric method at room temperature. The following indicators were used to cover their respective pH ranges:

La Motte Violet	pH 12.0-13.6
Sulfo Orange	pH 11.0-12.6
La Motte Purple	pH 9.6-11.2
Thymal Blue	pH 8.0- 9.6

pH in Water Solutions

Sodium bicarbonate, sodium carbonate, sodium hydroxide, sodium cyanide, and sodium potassium tartrate (Rochelle salt) were added to pure water using from 0 to 4 ounces per gallon. The variation in the pH of each solution with increasing concentration was noted and the results are shown in Figure 1.

It may be seen that for a pH range of 8 to 8.5, the bicarbonate curve exhibits a fairly constant pH. This indicates that the addition of sodium bicarbonate has little effect on the pH.

The sodium carbonate curve, above 0.5 ounces per gallon, shows a fairly constant pH with values between 11.5 and 12.0. This also indicates little effect of this addition on pH.

The sodium hydroxide curve shows a marked increase in pH to about 12.5, for less than 0.5 ounces per gallon. As the concentration increases above this value, the pH gradually rises. At high values of alkalinity, i.e., over 13.0 pH, the solution is fairly well buffered.

The sodium cyanide curve is quite similar to that for sodium carbonate. There is very little change in pH as the concentration of sodium cyanide increases from 1 to 3 ounces per gallon.

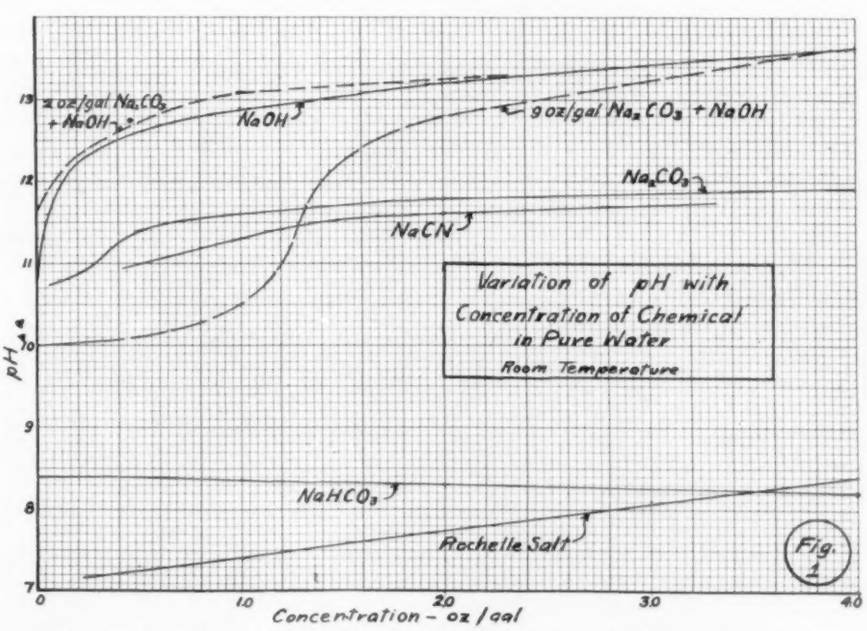

Fig. 1. Variation of pH with concentration of chemical in pure water

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The Rochelle salt curve shows a steady increase in pH from 7 to 8.5 as the concentration is raised to 4 ounces per gallon. This salt should not markedly effect the pH of a solution. Its buffer value would be expected to be less than that of sodium carbonate.

Adding sodium hydroxide to water containing 2 and 9 ounces per gallon of sodium carbonate respectively, gives curves that are similar to the sodium hydroxide curve at pH values above 12.0. At pH values between 11.0 and 12.0 the pH falls rapidly with slight changes in added alkali. This indicates no buffering and is entirely similar to the plain sodium hydroxide curve. At a pH of about 10.0, however, the carbonate curves again become horizontal indicating another well buffered pH range.

One would conclude, therefore, that above pH 12.0 the highly alkaline solutions will be little affected by small changes in hydroxide concentration. At pH values between 11.0 and 12.0 marked changes in pH will occur with slight changes in hydroxide concentration. At pH values below 11.0 the presence of carbonates will buffer the solution against pH changes resulting from changes in hydroxide concentration.

pH in Copper Baths

Changes in the pH of a Rochelle salt-copper bath were next investigated. Each constituent of the bath was varied singly. The results, as recorded in Table I, show that sodium carbonate, Rochelle salt and free sodium cyanide effect little or no change in the pH of the plating bath. This would be expected from the results obtained above using water solutions of individual chemicals. Furthermore, sodium hydroxide causes the same marked variation in pH in a Rochelle salt-copper bath as with water alone.

In practice, even though the bath composition is kept reasonably constant by analytical control, the pH will vary as the hydroxide concentration of the bath changes. Such changes may result from acid or alkali carried over from cleaning, from differences in electrode efficiencies, or from bath decomposition. The extent to which a given change in hydroxide concentration will affect the pH of the bath depends upon the buffer characteristics of the bath in the pH range involved. Furthermore, the amount of alkali to be added to a given bath to change the pH to a desired value will also depend upon the buffer characteristics of the bath.

A number of baths of varying composition were therefore prepared and their buffer curves determined. The bath compositions are recorded in Table II and the composite buffer curves are shown in Figure 2.

TABLE I. Effect of Variation in Cyanide Copper Bath Constituents[3] on the pH

Copper cyanide oz./gal.	Free cyanide oz./gal.	Soda ash oz./gal.	Rochelle salt oz./gal.	Sodium hydroxide oz./gal.	pH variation
3.5	(0-2.0)	2.0	4.0	.....	10.2-10.3
3.5	0.75	2.0	(0-2.0)	.....	10-0-10.2
3.5	0.75	(0-2)	4.0	.....	10.0-10.0
		(0-15)			10.4-10.7
3.5	0.75	2.0	4.0	(0-0.2)	10.0-10.4
				(0-0.4)	10.4-12.6
				(0-0.6)	10.4-12.8

[3] Variable in (—).

determined after each addition. In this way the pH versus added caustic soda or buffer curves were constructed.

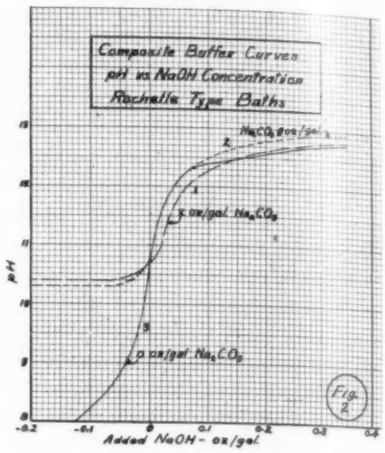


Fig. 2. Composite buffer curves; pH vs. NaOH concentration; Rochelle type baths.

The composite buffer curves in Figure 2 were then constructed from the individual buffer curves by starting at a common point of pH 10.7 for all baths. By so doing, it is seen that curves 1 and 2 for 2 and 9 ounces per gallon of carbonate are very nearly identical and are independent of the concentration of copper cyanide, sodium cyanide, and Rochelle salt within the limits studied.

Curve 3 is for baths 10 and 11, Table II, containing no added carbonate. It is particularly significant that all three curves are practically the same above a pH of 10.7. Below this pH the baths with carbonate are buffered and those with no carbonate are not buffered. This means that any bath containing carbonate at a pH of 12.0 or less will fall rapidly with a small decrease in hydroxide concentration until a pH of 10.3 or 10.4 is reached

TABLE II. Bath Compositions Studied

Bath No.	CuCn oz./gal.	Free NaCN oz./gal.	Rochelle salt oz./gal.	Soda ash oz./gal.	Variable
1	3.5	0.75	4	2	Reference bath
2	3.5	2.0	4	2	Higher free cyanide
3	3.5	0.75	4	9	Higher carbonate
4	4.0	1.6	..	2	No tartrate
5	5.5	0.75	4	2	Higher metal
6	7.0	0.75	4	2	Still higher metal
7	3.5	0.75	8	2	Higher tartrate
8	3.5	0.75	8	9	High tartrate & carbonate
9	7.0	0.75	8	2	High metal & tartrate
10	3.5	0.75	4	0	No carbonate
11	3.5	0.75	8	0	High tartrate, no carbonate

Buffer Curves

All baths initially had a pH of about 10.3 to 10.4 with the exception of baths 10 and 11, containing no soda ash. These baths had an initial pH of about 11.4. Caustic soda in small amounts was repeatedly added to a gallon of each bath and the pH was

at which point it will remain substantially constant. On the other hand, in the absence of carbonate the pH will continue to fall to pH values of 8 or 9 with only a small decrease in the hydroxide concentration.

The easiest pH to maintain in the Rochelle salt type of bath is undoubtedly on the flat part of the buffer curve corresponding to values above 12.0. A pH between 11.0 and 12.0 will be extremely sensitive to changes in hydroxide concentration.

The optimum pH range for practical operation of the Rochelle salt type of copper bath depends upon a number of factors. Part II of this paper will deal with the effect of pH upon anode behavior.

Computations in Solution Analysis

Q.—In reading the Platers' Guidebook, for this year of 1937, your work on Analyzing Plating Solution, page 50. C, metallic copper content

$$\left\{\begin{array}{l}\text{cc. Thiosulphate required for 0.20 grams of copper}\end{array}\right\} \times \frac{2.67^*}{\text{cc. of Thiosulphate required for sample of solution}}$$

I cannot figure out where you get the figures 2.67. I am not a professional chemist and it is rather complicated to me so if you will oblige me it will be quite a favor. I have been working by the Platers' Guidebook 1932, by Oliver J. Sizelove in standardizing sodium thiosulphate. Say in the calculation that 31.5 ccs. ($Na_2S_2O_35H_2O$) had been used (0.2 divided by 31.5 = 0.00635). Therefore, 1 cc. of ($Na_2S_2O_35H_2O$) is equal to 0.00635 gram of copper which I can understand and work out. My idea is to work out your system and then Sizelove's so as to check or confirm one system on another.

A.—In preparing the procedures for analyzing plating solutions to be included in the Platers' Guidebook, it was kept in mind that many platers do not have the requisite chemical training or equipment to employ very accurate and involved methods of analysis. The published procedures are therefore, in general, a compromise between precision methods and simple, rapid methods. Many of the analyses have been modified for the plater's use by sacrificing the ultimate in accuracy in favor of simplicity of performance. Thus in the analysis of a brass solution for free cyanide, the result is not the true value but a comparative one. For plant maintenance however, it is perfectly satisfactory.

With the thought in mind of eliminating any calculations which might be a source of possible confusion to the average plater, all the necessary computations were omitted from the procedures, only the results being given, so that in most cases only one simple division or multiplication is required for the determination of the factors for the standard solutions in the 1936 and 1937 editions of Platers' Guidebook. For example, in preparing standard sodium thiosulfate solution for determination of metallic copper, the factor is given in brackets as

$$\left[\frac{2.67}{\text{cc. Thiosulfate required for 0.20 gms. of copper}}\right]$$

If in the standardization, 27.3 cc. of thiosulfate was required, the factor becomes $\frac{2.67}{27.3}$ or 0.0978, or using a 10 cc. sample of plating solution, each cc.of thiosulfate is equivalent to 0.0978 oz./gal. of metallic copper.

Inquiries at various times seems to indicate that platers are not only interested in the performance of the analysis but also in the calculations, and they have expressed their desire to have the computations of the factors explained.

Although the numerator of the figures in the brackets at first glance may be difficult to visualize, it is arrived at by a series of simple calculations, which have not been included in the methods of analysis. Let us take, for example, the abovementioned figure for the standard sodium thiosulfate solution. The figure is arrived at as follows:

Exactly 0.20 grams of pure metallic copper are dissolved and titrated with the thiosulfate solution. If we let "A" represent the number of cc's. of thiosulfate required, each cc. is equivalent to $\frac{0.20}{\text{"A"}}$ grams of metallic copper.

If the 0.20 grams of copper are considered to be in a 10 cc. sample of plating solution, each cc. of thiosulfate will be equal to $\frac{0.20}{\text{"A"}}$ grams copper in 10 cc. of plating solution,

$= \frac{0.20}{\text{"A"}} \times 100$ grams copper per liter

$= \frac{0.20}{\text{"A"}} \times \frac{100}{7.5}$ ounces of copper per gallon

$= \frac{2.67}{\text{"A"}}$ ozs./gal. metallic copper

Suppose 27.3 cc. of thiosulfate solution are required for 0.20 grams of copper. Each cc. is therefore equivalent to 0.20/27.3 = 0.00733 grams of metallic copper. If this is considered to be the amount of copper in 10 cc. of plating solution, each cc. of thiosulfate is equivalent to $\frac{0.00733 \times 100}{7.5} = 0.0978$ oz./gal. of copper which is the factor for the standard solution.

Thus if a 10 cc. sample of unknown plating solution requires 32.5 cc. of standard thiosulfate, the copper content is:

0.0978 x 32.5 = 3.18 ozs./gal. of metallic copper.

It can be seen from the above that although the figure 2.67 is not self-explanatory, it obviates all but one calculation for the analyst and thus lessens the possibility of an error occurring.—NATHANIEL HALL.

Billions of Feet of Copper Wire

Over 100,000 pounds of copper wire of approximately the diameter of a human hair will be used by the Warren Telechron Company in Ashland, Massachusetts, in the construction of coils for its synchronous electric clocks this year.

This wire, which averages about 28,000 feet per pound, adds up to a total running length of 3,016,000,000 feet and if stretched out in a single length would encircle the globe 23.2 times.

Decorative Stop-Off Lacquer for Chrome Plating

Lacquer enamels which buff easily and act as a stop-off for plating solutions to give chrome and color two-tone effects.

By **LEO ROON**

Technical Director, Roxalin Flexible Lacquer Company, Inc., Elizabeth, N. J.

HOW often in the past has the Production Manager hoped for a decorative color coating that would act as a stop-off, preventing the deposition of metal on the color portions, while the chrome could be deposited on the bare highlights. Result—a large variety of beautiful metal color combinations and, from the production point of view, the elimination of several operations normally used to get the same effects.

Unfortunately, plating solutions are severely injurious to lacquers generally. Frequently those which can withstand the plating operation require a primer to bond them to the metal, because they have insufficient adhesion in themselves.

Too few platers and finishing men know that today finishes are available that have the plating resistance and the adhesion so that they may be applied in one coat with the elimination of the primer.*

In practically all cases of high grade enamel work, buffing is done to give smoothness, depth, and brilliance to the enamel coat. In the past, we usually identified enamels with hard, quite brittle films. Today, however, we have enamels which buff with ease, and yet with this unusual buffability, we retain such a high degree of flexibility that the enamel coat may still be blanked and formed to a high degree, after buffing and subsequent plating.

This remarkable combination of properties adapts the finish to an unusual degree not only to decorative objects where this flexibility is an index of high resistance to chipping, but to industries such as the etched name plate industry where the ability of the enamel to withstand deep draws as a part of the actual production process, is an absolute necessity.

The use of clear buffing lacquer over the enamel was resorted to in the past in order to meet the fore-outlined conditions, but even this step can now be eliminated.

To summarize the advantages that this type of material has over past practices, we list them as follows:

1—Direct adhesion to the base metal; no primer necessary.

2—Buffability without the use of buffing lacquer.

3—No need of using a baking primer underneath the color, or a clear top coat on top of the color for the purpose of improving the stop-off effect of the color coat.

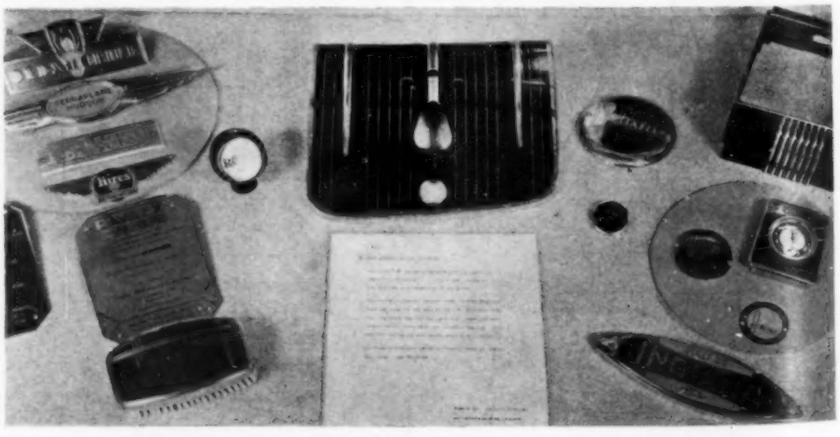
4—Flexibility to resist chipping or flaking on rigid objects, and flexibility sufficient to withstand blanking and deep drawing in fabrication.

It might be pointed out at this time that while this type of coating air dries with the speed of any ordinary lacquer enamel, and therefore enjoys the big advantage of a very early, quick dust-free time, it is necessary to bake it for an hour and a half at 275 deg. F., depending on the color, in order to give the coating all of the above mentioned properties.

The quick air-drying makes it possible to stencil as with the usual type of air drying lacquers, and when this work has been completed, to give the entire system one adequate bake.

Of course, there are instances where production requires that the article be chrome plated first, and the color coats stencilled in the depressions. The type of material described may be used in this manner, and after baking may be buffed, if required. It is important, however, that in such cases the chrome plated surface be thoroughly cleaned. In some cases this cleaning is accomplished by degreasing, but by far the best results are obtained by torching the chromium plated parts with a direct flame before applying the lacquer enamel.

In other cases where schedules do not call for chromium plating, but where two-tone lacquer enamel finishes are desired, it is unnecessary to use priming coats, as the one color of the two-tone combination is first applied



A few samples of work finished in chrome and buffing lacquer

*Plating operations usually comprise a regular cycle of chemical cleaning, rinsing, plating, rinsing and drying.

and then followed by a second coat of the other color of the combination, which system may be given one bake, or may be given two bakes, depending upon the nature of the service into which the ultimate object is to be placed.

This type of material also lends itself well to two-tone effects with basically different types of coatings equally as well, such as a texture finish which may be stencilled on, giving a combination of not only different harmonizing colors, but a combination of smooth and texture surfaces. Examples of this type of combination finish may be found extensively used in the finishing of business machines, where the texture surface eliminates the glare and is combined with the smooth surface which gives liveliness of appearance.

With the rapidly increasing popularity of zinc die castings, production men should know that this type of finish has excellent adhesion to zinc die castings, which, after color coating, may be chrome plated on the exposed highlights, giving chromium color combinations as illustrated in the clock cases. Excellent adhesion can be obtained on zinc die castings through the use of Lithoform before the application of the color coats.

Fig. 2. An interesting example of chrome and enamel on a desk clock

Industrial Uses for Silver*

Previous issues of the Technical News Bulletin have contained references to the investigation by the Bureau of Standards and a number of the leading silver producers on the problem of developing new industrial uses for silver. This culminated in the publication of Circular C412, "Silver: Its Properties and Industrial Uses" in October of last year. See Technical News Bulletin 236, page 113 (December 1936).

Since that time a new project has been started, officially designated as the American Silver Producers' Research Project, having the same general objective as the first investigation, but designed to attack the problem on a much broader front. Fifteen research fellows have been located in 9 different institutions, including the Bureau, and are working on various phases of the problem. At the present time preliminary arrangements have been completed, all the fellowships awarded, funds allocated, and the main outlines of the approach decided upon.

The schedule includes studies of argyria, bactericidal properties, chemical properties, fungicidal properties, physico-chemical properties, electroplating, electrical characteristics, thermal properties, and metallurgical possibilities.

The whole project will be coordinated from the National Bureau of Standards. Since the metallurgical field at present appears the most promising for new uses capable of absorbing a considerable part of the annual silver production, 7 of the 15 men chosen as research fellows have been assigned metallurgical problems. Three of these seven have been assigned to the Bureau's Division of Metallurgy, headed by *H. S. Rawdon.* The senior research associate, *A. J. Dornblatt*, formerly head of the metallurgy and chemistry section of the United States Naval Academy Post Graduate School, will act as the coordinating officer for the entire project so that duplication of work among the different laboratories will be avoided. A considerable portion of his time will be spent with industry in order that commercial concerns may be interested in the work being done and to insure that the project does not duplicate work being carried on in industrial laboratories. *Mr. Dornblatt* will be assisted by *A. M. Setapen*, research associate, formerly teaching assistant in the Graduate School of the Carnegie Institute of Technology, and by *T. W. Allen*, research assistant.

Some problems being investigated include the effect of silver additions on the common engineering alloys, development of mechanically superior high-silver alloys, characteristics of silver commutators, effects of silver in bearing metals, piston ring inserts of silver or silver alloy, silver soldering irons, characteristics of welding rod containing silver, catalytic properties of silver, heat-transfer data on silver and its alloys, optical reflectivity of silver alloys, effect of silver on spore germination, intravenous injection of silver compounds, and electrodeposition of silver alloys.

It is the intention to publish progress reports from time to time in the Technical News Bulletin. It is also desired and planned to cooperate with industry in following up suggestions regarding possible new industrial applications of silver.

*From the Technical News Bulletin (Aug. 1937) of the National Bureau of Standards, Washington, D. C.

Bronze Windows

An interesting release from the *Copper & Brass Research Association*, 420 Lexington Ave., N. Y., describes recent infiltration tests conducted by the *Daniel Guggenheim School of Aeronautics*, New York University, on windows. The results of the tests, it is stated, show that a bronze window which was included among others tested gave unusually good performance allowing only 0.14 cu. ft. of air per minute per foot of sash perimeter compared with 1.25 cu. ft. per minute, the volume allowed in U. S. Government standard specifications. Leading manufacturers of bronze windows are now working on the project of manufacturing for use in all types of homes in small monumental buildings and palatial mansions. As a result of increased sales it is expected that costs, will be reduced. The advantage to the home owner is the exclusion of dust and dirt, lessening the drudgery of housework, reduced costs in heating the home.

Plating Research Questions Clarified

Report of conference on supplemental exposure tests of plating, principally on non-ferrous metals. National Bureau of Standards, Washington, D. C., October 6, 1937.

THE purpose of this conference was to secure information and recommendations regarding the scope and the methods to be used in additional exposure tests. Over 40 persons were present, including many members of the American Electro-Platers' Society and the American Society for Testing Materials, and representatives of firms engaged in plating and in the plating supply business.

In order to clarify the various activities related to electroplating, a list of the committees directing such projects was distributed. The status of the exposure tests now in progress was then explained.

On account of the increasing commercial application of bright nickel solutions, serious consideration was given to their inclusion in the new exposure tests. It was emphasized that the primary purpose of any such exposure tests would be to determine whether in general, deposits from bright nickel solutions are equal, inferior or superior to ordinary nickel deposits of the same thickness; and not whether one of the bright nickel solutions is better than the others. In view of these facts, it was recommended that each proprietor of such solutions as are in extensive use, be invited to supply a quantity of his solution, and to advise regarding its satisfactory operation at the National Bureau of Standards. The specimens thus produced, from for example four bright nickel solutions, will all be marked alike, and will not be distinguishable from each other. The composite results obtained from exposures of these specimens will then be taken to represent the average performance of the bright nickel solutions in present use.

It was recommended that these bright nickel coatings and also regular nickel coatings be applied in appropriate thicknesses to steel, brass, and zinc base die-castings.

It was agreed that some of the zinc base die-castings should be plated in commercial plants. If proprietary bright nickel solutions are there in use, they will be employed, but without reference to the name of the solution.

It was recommended that most of the tests on brass be on rolled high brass, and those on zinc be on XXIII alloy. On brass, additional thicknesses

W. M. PHILLIPS
Chairman, Research Committee, A.E.S.

of nickel and of chromium were proposed. It was suggested that some of the die-castings be plated without polishing prior to plating, in order to determine the effect of polishing the base metal. The use of the Rochelle salt-cyanide copper bath was recommended for die-castings.

In a discussion of the sites for the exposure tests it was pointed out that in evaluating the results, attention should be called to any marked differences in behavior in different locations, and not simply to the average scores.

In view of the extreme severity and inaccessibility of the present site on Brunot's Island in Pittsburgh, it was recommended that steps be taken to secure a somewhat less severe and more accessible site, preferably in the Pittsburgh district.

The present system of rating was approved, but in addition it was suggested that on iron and steel, separate ratings be given for rust and for other defects. On non-ferrous metals, notes regarding the prevalence of specific defects were suggested to supplement the numerical ratings.

The present practice of cleaning a certain proportion of the specimens at long intervals was favored. The use of a thin grease film on a small proportion of the specimens in order to simulate the behaivor of exposed parts to which grease or wax has been applied, was also sanctioned.

At a meeting of the Research Committee and the Joint Committee, the above recommendations were unanimously approved and the preparation of a program incorporating these features was authorized. Every effort will be made to complete the plating of the new specimens in time to start the new exposure tests in the spring of 1938.

List of Persons Attending the Conference

E. A. Anderson, New Jersey Zinc Co.
Oscar H. Bahr, Kohler Company.
W. E. Baulieu, Jr., Bridgeport Brass Co.
W. Blum, National Bureau of Standards.
Adolph Bregman, METAL INDUSTRY.
A. Brenner, National Bureau of Standards.
T H. Chamberlain, New Haven Clock Co.
T. G. Coyle, United Chromium, Inc.
Jos. L. Downes, Remington Rand Co.
L. E. Eckelmann, Pyrene Mfg. Co.
James Fraser, Sanitary Brass Association.
John R. Freeman, Jr., American Brass Co.
E. Fritts, Ternstedt Mfg. Co.
A. K. Graham, A. K. Graham & Associates.
Carl E. Heussner, Chrysler Corporation.
R. E. Hicks, Yale and Towne Mfg. Co.
G. B. Hogaboom, Hanson-Van Winkle-Munning Co.
L. W. Hopkins, American Chain & Cable Co.

H. M. Johnquest, Bridgeport Brass Co.
W. J. R. Kennedy, American Electro-Platers' Society.
C. Kasper, National Bureau of Standards
B. H. McGar, Chase Brass & Copper Co.
K. J. McKay, International Nickel Company.
C. J. Mond, Sanitary Brass Association.
E. V. Mott, Western Union Telegraph Co.
W. A. Olson, National Bureau of Standards.
W. M. Phillips, General Motors Corporation.
P. R. Pine, Harshaw Chemical Co.
W. B. Price, Scovill Mfg. Co.
Bert Sage, A. S. Campbell Co.
C. H. Sample, Bell Telephone Co.
P. M. Savage, McGean Chemical Co.
Philip Sievering, Sievering, Inc.
T. F. Slattery, U. S. Bureau of Engraving & Printing.
L. N. Smith, Harshaw Chemical Co.
G. Soderberg, Udylite Company.
P. W. C. Strausser, American Electro-Platers' Society.
M. R. Thompson, National Bureau of Standards.
Van Winkle Todd, Hanson-Van Winkle-Munning Co.
C. A. Vincent-Davies, R & H Chemicals Dept., E. I. du Pont de Nemours & Co.
W. A. Wesley, International Nickel Company.
Louis Weisberg, L. Weisberg, Inc.
A. B. Wilson, Chevrolet Gear & Axle Co.
Maxwell M. Wise, Parker-Wolverine Co.
C. W. Yerger, Hanson-Van Winkle Munning Co.

Memorandum of Committees Engaged in Activities of Direct Interest to the Electroplating Industry

I. Introduction

During the past several years, various projects have been conducted upon different phases of electroplating, frequently through the cooperation of two or more associations or institutions. In the latter cases, joint committees have been organized in order to provide adequate representation of the various agencies. For these committees to function most efficiently, it is desirable that all interested persons transmit to the chairman or to the other members, their suggestions and comments. This informal memorandum has been compiled by W. Blum to list the membership and principal activities of these committees, and to foster such cooperation. Corrections, or information regarding committees that have been overlooked, will be gladly received.

II. Research Committee, American Electroplaters' Society

1. Functions: To plan and conduct researches of interest to the electroplating industry, to cooperate in researches with other organizations concerned with electroplating, to raise funds from manufacturers or other sources to be used in such researches, and to expend these funds for such activities.

2. Personnel:—

W. M. Phillips, Chairman, General Motors Corporation, Detroit, Michigan.
T. H. Chamberlain, Vice-Chairman, New Haven Clock Co., New Haven, Conn.
E. A. Anderson, New Jersey Zinc Co., Palmerton, Pa.
William Blum, National Bureau of Standards, Washington, D. C.
G. M. Cole, Delco-Remy Division, General Motors Corporation, Anderson, Indiana.
Jos. L. Downes, Remington-Rand, Inc., Middletown Plant, Middletown, Conn.
Albert Hirsch, 1945 W. Airdrie St., Philadelphia, Pa.

Dr. W. BLUM
Chairman, Joint Committee, A.E.S., A.S.T.M. and Bureau of Standards

G. B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.
Carl E. Heussner, Chrysler Corporation, Detroit, Michigan.
B. H. McGar, Chase Brass & Copper Co., Waterbury, Conn.
Bert Sage, A. S. Campbell Co., East Boston, Mass.
P. M. Savage, McGean Chemical Co., Republic Building, Cleveland, Ohio.
Erwin Sohn, Standard Sanitary Mfg. Co., Louisville, Ky.
C. S. Tompkins, J. B. Ford Sales Co., Chicago, Ill.
W. A. Wesley, International Nickel Co., Bayonne, N. J.
A. B. Wilson, President (ex. off.) Chevrolet Gear & Axle Div., General Motors Corporation, Detroit, Michigan.
Wm. J. R. Kennedy, Secretary-Treasurer, (ex. off.), 90 Maynard St., Springfield, Mass.

III. Joint Committee of the American Electroplaters' Society, American Society for Testing Materials, and National Bureau of Standards on Exposure Tests of Plating on Nonferrous Metals

1. Functions: This committee includes five representatives from the American Electroplaters' Society, five from the American Society for Testing Materials, and one from the National Bureau of Standards. Its duties include the detailed planning of the exposure tests now in progress (chiefly on non-ferrous metals, but including some steel specimens), inspection of the specimens, preparation and publication of reports, and the preparation of specifications for plating on non-ferrous metals based on the exposure tests and other available information.

2. Personnel:—

	Representing
William Blum, Chairman, National Bureau of Standards, Washington, D. C.	NBS
T. H. Chamberlain, New Haven Clock Co., New Haven, Conn.	AES
B. H. McGar, Chase Companies, Waterbury, Conn.	AES
C. F. Nixon, Ternstedt Div., General Motors Corporation, Detroit, Michigan	AES
W. M. Phillips, General Motors Corp., Detroit, Michigan	AES
W. A. Wesley, International Nickel Co., Bayonne, N. J.	AES
To be appointed	ASTM, A-5
J. R. Freeman (Alternate A. W. Tracy), American Brass Co., Waterbury, Conn.	ASTM, B-3
Sam Tour, Lucius Pitkin, 47 Fulton St., New York City	ASTM, B-3
J. C. Fox, Doehler Die Casting Co., Toledo, O.	ASTM, B-6
Carl E. Heussner, Chrysler Corporation, Detroit, Michigan	ASTM, B-6

IV. Joint Committee of the AES, ASTM, and NBS on Specifications for Electroplated Coatings on Steel

1. Functions: This committee prepared the Tentative Specifications for Electrodeposited coatings of Zinc (A164-35T), cadmium (A165-35T), nickel and chromium (A166-35T) on steel, that were adopted by the AES and ASTM in June 1935. The committee is responsible for recommending any changes or additions that should be made to these specifications prior to their adoption as "Standards" of the ASTM and AES.

2. Personnel:—

	Representing
W. M. Phillips, Chairman, General Motors Corporation, Detroit, Michigan	ASTM
William Blum, Secretary, National Bureau of Standards, Washington, D. C.	NBS
F. M. Crapo, Indiana Steel & Wire Co., Muncie, Ind.	ASTM
L. W. Hopkins, American Chain Co., Bridgeport, Conn.	ASTM
L. H. Winkler, Bethlehem Steel Co., Bethlehem, Pa.	ASTM
To be appointed	ASTM
W. S. Barrows, 628 Dovercourt Rd., Toronto, Can.	AES
G. B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.	AES
A. Pearson, Western Electric Co., Chicago, Ill.	AES
O. J. Sizelove, 919 Chancellor Ave., Irvington, New Jersey	AES

V. ASTM Committee on Methods of Testing Electroplated Coatings on Steel

1. Functions: This committee was appointed by Sub-Committee (Methods of Testing) VII of A.S.T.M. Committee A-5 (Corrosion of Iron and Steel). Its purpose is to prepare exact descriptions of approved methods for testing plated coatings on steel, with a view to their inclusion in the tentative specifications that have been or may be adopted for such coatings.

2. Personnel:—(One more to be appointed).

W. M. Phillips, Chairman, General Motors Corporation, Detroit, Michigan.
W. Blum, Secretary, National Bureau of Standards, Washington, D. C.
E. A. Anderson, New Jersey Zinc Co., Palmerton, Pa.
E. M. Baker, University of Michigan, Ann Arbor, Mich.
W. H. Graves (alternate J. Higgins), Packard Motor Car Co., Detroit, Michigan.
**G. B. Hogaboom*, Hanson-Van Winkle-Munning Co., Matawan, N. J.
L. H. Hopkins, American Chain Co., Bridgeport, Conn.
**G. Soderberg*, Udylite Company, Detroit, Michigan.
E. S. Taylerson, American Sheet & Tin Plate Co., Pittsburgh, Pa.

*Sub-Committee on Methods of Sampling.

VI. Sectional Committee on Specifications for Zinc Coating on Iron and Steel

1. Functions: This committee was appointed to carry out Project G8 of the ASA (American Standards Association). Its "sponsor" is the A.S.T.M. Its functions include the preparation of specifications and tests for all kinds of zinc coatings on all types of iron and steel articles. It includes representatives of 32 associations or institutions, listed in the ASTM Year-Book.

2. Personnel: —

J. A. Capp, General Electric Co., Schenectady, N. Y.—Chairman.
A. B. Campbell, Edison Electric Institute, 420 Lexington Ave., New York City—Secretary.
G. B. Hogaboom, Hanson-Van Winkle-Munning Co., Matawan, N. J.—Representing AES.

VII. American Standards Association

Sub-Committee to prepare safety code for sanitation in electroplating operations.

1. Functions: This committee was appointed to prepare a safety code for the electroplating industry with special reference to ventilation in chromium plating and other hazardous plating operations.

2. Personnel: —

J. J. Bloomfield, Chairman, U. S. Public Health Service, Washington, D. C.
Cyril Ainsworth, Secretary, American Standards Association, 29 West 39th St., New York City.
J. R. Allan, International Harvester Co., 606 South Michigan Ave., Chicago, Ill.
William Blum, National Bureau of Standards, Washington, D. C.
J. M. Dalle Valle, U. S. Public Health Service, Washington, D. C.
S. W. Gurney, Liberty Mutual Insurance Co., Boston, Mass.
Carl E. Heussner, Chrysler Corporation, Detroit, Michigan.
Fred Sehl, Aetna Life Insurance Co., Hartford, Conn.

VIII. Electrochemical Society—Committee on Subjects for Research in Electrodeposition

1. Functions: This committee was recently appointed by the Electrodeposition Division of the Electrochemical Society to prepare a list of problems that may be suitable for research in industrial, educational and institutional laboratories.

2. Personnel:—

William Blum, Chairman, National Bureau of Standards, Washington, D. C.
Carl E. Huessner, Chrysler Corporation, Detroit, Michigan.
U. C. Tainton, 3100 Elm Avenue, Baltimore, Maryland.

Cleaning Brass Castings

Q.—We have a small job shop brass foundry manufacturing brass and aluminum castings. In cleaning our castings, they have not been entirely satisfactory. We would like you to advise us of a good method and if necessary, a good solution or chemical to be used in cleaning them.

We have a small tumbler which will hold several hundred pounds of miscellaneous castings. Our present method is to fill this full of sand and water and tumble them for about 45 minutes.

A.—You may use a sand blast tumbling barrel or sand blast which can be run with steel shot and cleans the castings very nicely, removes all sand and produces a fine finish that should be satisfactory. If you desire to use a tumbling barrel, we suggest a water tumbling barrel lined with wood, and brass skimmings used to scour and clean the castings instead of sand. Then dip in an acid mixture. The following dip is good for this purpose as it does not fume like regular brass dip:

Sulphuric acid	10 pounds
Saltpetre	2 pounds
Water	5 pounds

First, dissolve the saltpetre in water in an earthenware crock. Add 1 lb. acid in a thin stream, stirring meanwhile with a piece of glass. This will heat the water and it is necessary to stop the addition of acid from time to time in order to allow the solution to cool and prevent it from reaching a boiling temperature. For this reason the acid is added gradually and only a pound at a time.

The solution should be prepared at night and before morning it will be cold. Pour the acid off into another vessel and it is ready to use.

The castings are dipped for a few seconds, strung on a wire if possible; then rinsed in running water. They will keep their color better if they are dried by dipping in hot water in which a little lime is dissolved.

The only other method is to use a flexible wire wheel mounted on a grinding wheel stand and brush the castings.

It would seem that the sand-blast which can be had in a very small unit would be the better method.

—W. J. Reardon.

Improved Quality Through Modernized Polishing Methods

Producing high grade products by the most economical methods in the production of builders' hardware.

By JOSEPH T. REILLEY

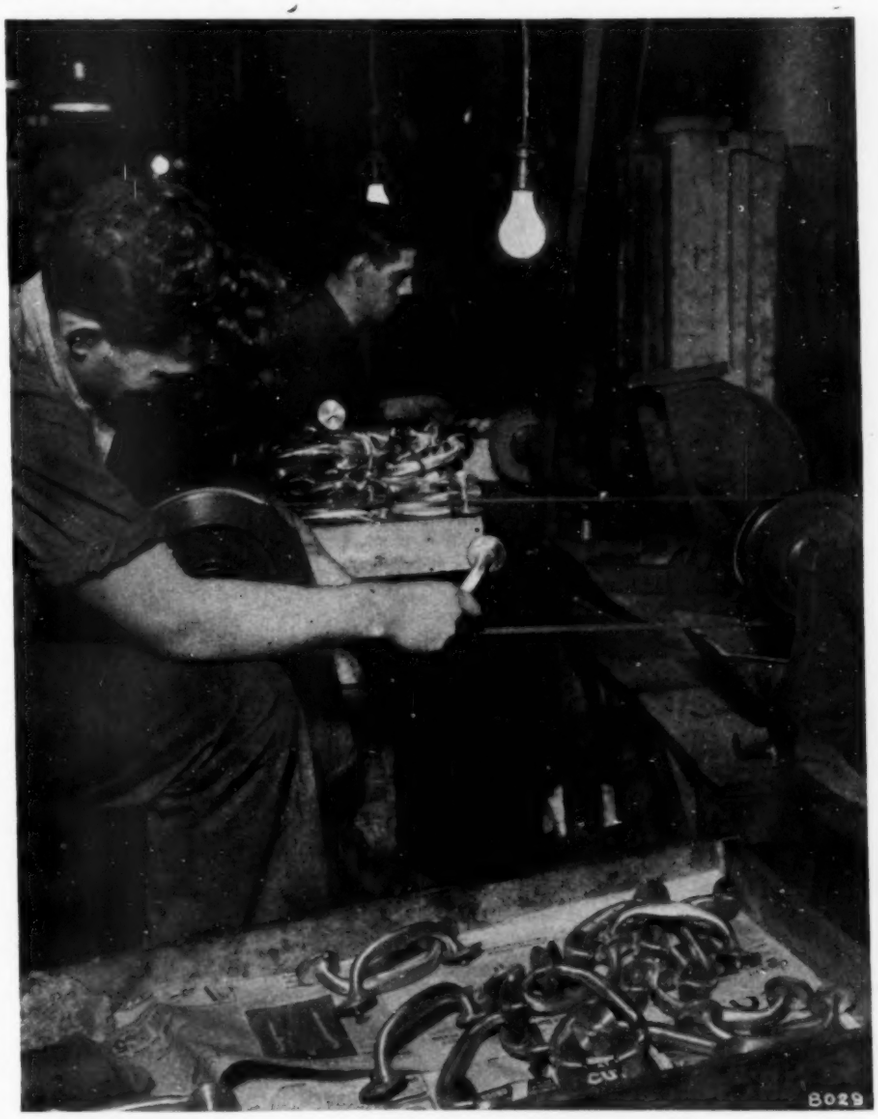
Foreman, Polishing Department, Lockwood Hardware Manufacturing Co.,
As told to FRANCIS A. WESTBROOK

THIS Company has recently developed improvements in its products in both design and quality in which the matter of polishing and finishing have played a most important part. The present management has, of course, devoted much thought to every step in the processes of manufacture and fabrication, but so much attention has been given to polishing and finishing its very complete line of builders' hardware, (practically all made of brass and bronze, cast, forged or extruded) that it is worthy of special consideration. As might be expected when a high quality line is being developed and placed on the market the finish is of the utmost importance.

Polishing Escutcheon Plates

In order to understand just how carefully these processes have been worked out, it will be best to follow through some particular part. Rough castings for flat escutcheon plates are first polished on a No. 60 Alundum wheel, which is followed by a No. 90 wheel, before any of the machining operations take place. After the parts come back from the machine shop to the polishing department they are again put through on the No. 90 wheels to remove burrs, etc. This is followed by polishing on No. 150 wheels and finally on No. 240 wheels, all Alundum. Where the final finish required is dull, nothing more is done. For bright finishes the pieces are first buffed with tripoli and colored with lime compound.

With flat work this procedure is simple enough. With irregular shapes like grips, where the surfaces are in part curved and in part made up of intersecting plane surfaces, the different parts or grains are followed with different kinds and shapes of wheels. Thus the first and second polishings on flat surfaces are with No. 60 and No. 90 rag wheels; while the rounded face of the grip is polished on No. 60 compressed leather or canvas wheels, followed by No. 90 and finished on No. 120 rag wheels. The hard leather or compressed canvas wheels are contoured to conform to the design of the piece. Certain die-castings are given the rough polish with No. 120 Alundum because of the softer metal, and the



Polishing irregular surface of grips on belt machines

narrow edges of many designs in brass or bronze can be roughed on No. 90.

The polishing equipment consists of fifty-eight frames arranged in two double lines with exhaust pipes between them. Each of these exhaust lines is served by a separate 55" Buffalo Forge fan.

For final finishing, some parts are plated after the polishing operations which have been described, and in other cases the plating is omitted. In all cases the dry buffing is generally done with rag wheels and a greaseless compound, although a soft wire brush may be used to good advantage in certain instances.

The Wheel Room

The wheel room is an important adjunct to the polishing department. Wheels with all sorts of shapes and contours are made and stored here for the various products. A man does nothing else but set up wheels as required for production purposes, and cleaning and setting up old ones when the grain is worn off. He also turns them to the desired shape. Leather covered wooden block wheels are used for all flat work. For irregular shapes, leather or canvas compresses with the proper contours are used and the finishing is with felt or rag wheels. For buffing irregular shapes, rag wheels are soft enough to assume automatically the shape which the part has already been given by previous operations.

The Emery Belt

A piece of equipment which has proved to be a great labor saver in the finishing department is the emery belt. This is very fast for finishing small items in large quantities. It has the further practical advantage that it tends to produce a very accurate plane surface on the pieces applied to it. Belts are stocked in quantity and it has been found by experience that six different grains varying from 36 to 180 are sufficient for the requirements here.

The matter of providing for the economical production of large quantities of small parts is very important. The Company makes something like 10,000 different items in its various lines, each of which has numerous different finishes. Consequently new automatic machinery has become a part of the general plan.

Quality and Economy

Another point which should be stressed is the very important part which polishing plays here in the improvements which have been made in the complete line of builders' hardware which this Company has made during the last five years. Very careful analyses were made of what grains and methods of procedure would give the best results, due regard being given economy insofar as consistent with the high standards of quality which were set. For this reason the practice described represents the result of research both from the technical and sales standpoints, and the volume of business has been such as to show conclusively that the management planned well.

Polishing brass knobs on No. 120 rag wheel

Square Solder Wire*

Solder wire of less than the usual diameter of 1/8 inch has important advantages, particularly for those who solder with a blowtorch or with a jeweler's blowpipe. By having the wire in a number of sizes, it is easy to cut off just the right amount of solder for putting two small parts together; while if many pieces are needed, they can be made of practically the same size, if this is desirable. An additional improvement, which seems to have originated with a former mechanician of the Bureau of Standards, is to make the wire square, instead of round. If it is of this shape, the small pieces cut off do not roll out of place when the flame hits them.

*From the Technical News Bulletin (Aug. 1937) of the National Bureau of Standards, Washington, D. C.

Electrochemical Society Holds Special Scientific-Technical Session on Electroplating

THE Electrochemical Society held its 72nd meeting in St. Louis, October 13-16. Among the features of this meeting was the award of the Edward Goodrich Acheson Medal and $1,000 prize to *Dr. Frederick Mark Becket* of New York City in recognition of his outstanding accomplishments in Electrothermics. At the Medal Presentation ceremonies directly following the dinner, *William G. Harvey*, President of the Society, briefly outlined the history of this award, *Dean C. E. MacQuigg* gave a short address on "*Becket as a Friend and Associate*," and *James H. Critchett* spoke on "*Mr. Becket's Scientific and Technical Accomplishments.*" *Dr. Becket* told, in his address of acceptance, a few of the many experiences he has had in electrometallurgy.

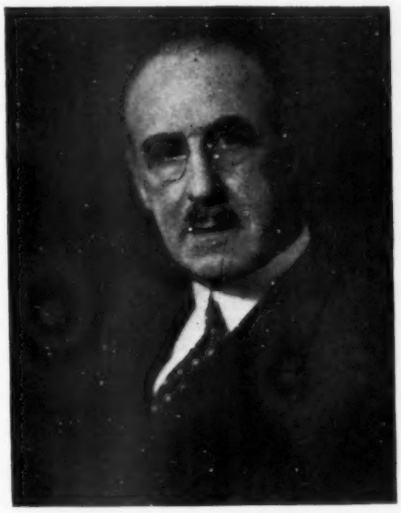
Interesting industrial trips were made by the attendants at the convention including the *Lewin Metals Company*, ingot makers; *Chandeysson Electric Company*, manufacturers of electroplating generators; *The Koken Companies*, electroplating department.

A special session was held on Electroplating with *Dr. Hiram S. Lukens*, University of Pennsylvania, presiding. Abstracts of some of the papers presented at the meeting are given below.

The Electrodeposition of Tin Part II. Anode Maintenance of an Alkaline Stannate Bath.

By LAWRENCE E. STOUT AND ALBERT H. BAUM

Electro-tin plating, from alkaline stannate baths, has two main difficulties. The tin content of the bath is depleted by precipitation of metastannic acid and by unbalanced electrode efficiencies. The former is excessive at low caustic concentrations but is reduced by operating the bath at higher alkalinities. This high caustic content, however, tends to produce spongy cathode deposits unless other precautions are taken. The relative rate of anode corrosion may be varied by increasing the anode to cathode ratio and by anodic polarization. This polarization is attained by increasing the anode current density to a critical value at which the tank voltage suddenly increases and a green anode film develops. The value of this critical anode current density depends upon the caustic content in excess of that formed by the hydrolysis of sodium stannate. With proper attention to these factors it has been demonstrated that tin plating baths can operate for long periods of time and maintain a constant tin content from anode corrosion and without the use of oxidizing agents (sodium perborate or hydrogen peroxide) in the plating bath.



Blackstone Studio.

Dr. F. M. BECKET
Edward Goodrich Acheson Medallist

Solvent Degreasing

By W. W. DAVIDSON

The solvent degreasing process for the removal of oil and grease from articles prior to being electroplated or otherwise "finished" is described in some detail. Fundamental principles of equipment design and the characteristics of the stabilized, non-inflammable solvents are discussed.

Electrolytic Production of Beryllium-Copper Alloys

By COLIN G. FINK AND TSING-NANG SHEN

On investigating the electrolytic production of beryllium-copper alloys by discharging beryllium into molten copper serving as cathode in a fused beryllium oxyfluoride bath, it was found that the efficiency of the cell increased as the quantity of beryllium carbide formed was reduced. The conductivity of the electrolyte composed of equal parts of beryllium oxyfluoride and barium fluoride is markedly improved by the addition of sodium fluoride. Of the various baths tried, the one consisting of 50 parts by weight of beryllium oxyfluoride, 34 parts of sodium fluoride, and 16 parts of barium fluoride gave the best results. The current efficiency on the basis of beryllium metal deposited was 48.7 per cent and the yield was 0.863 gram of beryllium per kw-hr. Alloys containing over 3 per cent Be were thus produced.

The Efficiency of Organic Inhibitors during Pickling of Iron

By WILLY MACHU

Experimental proof is submitted to show that the electrochemical or overvoltage theory heretofore advanced to account for the action of inhibitors in pickling solutions does not hold. Results indicate that, due to adsorption, a film is formed over both the metallic iron areas and the oxidized or scaled areas. However, the practical success in the use of inhibitors is due to the greater adsorption of inhibitor at the metallic areas as against that at the oxidized or scaled areas. Accordingly, since the time of diffusion of the acid ions through the inhibitor film will be the longer the greater the thickness of the film, the oxidized or scaled areas will be more readily attacked by the acid than the metallic areas.

Nickel-Cobalt Alloy Plating from Low pH Acid Sulphate Solutions

By C. B. F. YOUNG AND CHARLES EGERMAN

The codeposition of nickel-cobalt alloy from a strong acid sulfate solution was investigated with the aid of a rotating cathode. The effect of

agitation, current density, temperature, hydrogen ion concentration, and of an addition agent was determined. It was found that: (1) Increasing the agitation resulted in an increase in the cobalt content of the deposited nickel-cobalt alloy; (2) Increasing the current density decreased the cobalt content of the alloy deposit; (3) Raising the temperature caused an increase in the cobalt content of the deposit; (4) Increasing the hydrogen ion concentration resulted in an increased cobalt content of the deposited alloy; and (5) The presence of an addition agent as a brightener did not affect the composition of the deposit.

The Behavior of Alloy Anodes in Deposition of Silver-Cadmium Alloys from Cyanide Baths

By CHARLES L. FAUST AND DONALD J. HENRY

Cadmium-silver alloys containing 10 per cent Ag + 90 per cent Cd, and alloys with 90 per cent Ag + 10 per cent Cd were deposited from cyanide baths, using alloy anodes of the same composition as the deposit. Good reproducibility of results is possible. The anodes of duplex alloy structure required closer current density control than the single phase, solid solution type of alloy. On account of deposition of silver displacement on the 2 per cent Ag + 98 per cent Cd alloy anodes, irregular dissolution was obtained with such anodes and a relatively high anode current density is required in order to minimize or eliminate the chemical displacement of silver on the anodes during use.

The Composition of Some Complex Metallic Cyanides
1. Potassium Silver Cyanide

By ROY L. DORRANCE, R. C. ELLIS AND A. D. MATHESON

Conductometric and potentiometric titrations of potassium cyanide and silver nitrate lead to the belief that the complex cyanide can be represented by the formula $KAg(CN)_2$. Free cyanide cannot be titrated by silver nitrate using a silver electrode.

Dr. H. S. LUKENS
Chairman, Electrodeposition Session

Hazards of Metal Spraying*

Addressing the Massachusetts Safety Conference on "Ventilation Requirements in Metal Spraying," *Herbert I. Miller* of the Harvard School of Public Health, said in part:

"The increasing prominence of the spray method of applying metal coatings for protective, decorative, and other purposes, together with the absence of literature on the hygiene of the process, has led us to study the problem at the Harvard School of Public Health. The process employs a spray gun which, using oxygen, acetylene, and compressed air, converts wire into tiny molten drop-lets that are blown onto the surface to be coated. The very fine particles, failing to impinge or adhere, remain suspended in the air for varying lengths of time, depending on their size, their specific gravity, and on the ventilation. These particles constitute a health hazard since the toxicity of harmful substances is much greater when inhaled than when swallowed.

"Suspensions of each of several metals were produced with the gun in a gas-tight, unventilated cabinet of about 1,600 cubic feet capacity. Estimates of concentrations and settling rates were made with appropriate instruments to obtain relative values for persistence of the fume of the various metals over equal periods of time. Particle size was determined microscopically. A hood, 18" x 27", was then set up within the cabinet. Small articles were sprayed within the hood to simulate industrial practice. The atmosphere at the sprayer's breathing level and at other places inside and outside the cabinet was sampled during spraying at various face velocities across the hood. Lead and zinc, the two metals easiest to spray, were investigated in this manner. The hood was removed and the cabinet ventilated directly. Objects were sprayed on the floor of the cabinet using these two metals while various face velocities were maintained across the cabinet door, samples of the air at the cabinet door and in the room outside the cabinet being taken.

"It was found that a great part of fume was of submicroscopic size. Lead, as was to be expected from its high specific gravity and the manufacturer's recommended rate of spraying, furnished the fume of highest concentration and of greatest persistence. It was deemed then, that proper ventilation of lead fume would surely constitute sufficient ventilation for that of other metals and it was, therefore, made the basis of the ventilation portion of our study. Zinc was studied to establish the truth of this theory.

"The high pressure of gases at the gun nozzles gives rise to a very high volume and velocity of fume bearing gas that renders small hoods ineffective even with face velocities as high as 550 feet per minute as enough lead and zinc then escapes to produce unhealthful conditions. Experiments with the spray room minus the hood showed satisfactory removal of dust when a face velocity of 200 feet per minute was maintained across the door. Zinc required about 100-125 feet per minute. It is advisable, then to employ a spray room of sufficient volume to dissipate the velocity of the gases from the gun. The exhaust duct should be placed in the wall opposite the door and above the center of the room. The spray men should be protected with a positive pressure mask as is commonly used in paint spraying."

*From the National Safety Council.

Shop Problems CASTING • METALLURGICAL FABRICATION • ASSEMBLING • • PLATING • FINISHING

Questions from readers relating to shop practice and answers by our associate editors

Black Gold Plate

Q.—We are taking the liberty of sending you today by mail part of a gold solution which you will please analyze.

All of a sudden the articles we put in the solution turned black. This never happened before and we, therefore, would like to know why this happened. Please let us know at your earliest convenience.

A.—The composition of the gold solution shows approximately 2 dwt./gal. of gold and 1 oz./gal. of free cyanide.

There are other factors effecting the results as this composition should produce a suitable gold deposit.

The solution gave evidence of having a high concentration of salts and possible contaminating elements, such as copper or lead. The contamination may have occurred due to a piece of work lying in the bottom of the solution or to the gradual dragging over of the solution from a preceding operation. In some cases the effect of impurities can be overcome by adding more free cyanide, and a satisfactory plate can be obtained until the impurities are worked out. Failing in this the most direct procedure would be to recover the gold from the present solution by any of the standard methods and make up a new solution.

—G. B. H., Jr., Problem 5,618.

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Blistered Plate on Die Castings

Q.—Would you please give me some advice on the following problem.

I am having trouble with blistered deposits on zinc base die castings.

At times the blisters do not show after copper plating but appear on the nickel plate. In every case the blisters are right down to the base metal.

We are using a high speed, low pH bright nickel solution. The analysis is as follows: $NiSO_4$, 40 oz. per gal.; NiCl, 6 oz. per gal.; H_3BO_4, 4 oz. per gal.

We are copper plating the die casting and then direct nickel plating without copper buffing. Our copper solution is as follows:

Metallic copper	2.65 ozs./gal.
Rochelle salts	4.13 ozs./gal.
pH	11.5
NaCn	0.47 oz./gal.

If the trouble is due to porous castings as it appears, what is the remedy? Would you suggest an immersion tin dip before copper?

I am using a regular manufactured cleaner for die castings and a 5% sulphuric acid rinse before coppering. Would you suggest a light acid rinse after copper?

A.—In order to obtain reliable results in the copper plating of die castings a heavy copper deposit is necessary. The usual recommendation is three to four ten thousandths of an inch. This is to prevent peeling that will occur as a result of the absorption of part of the copper plate by the zinc.

A thin deposit of copper will not only cause trouble from absorption but will also be porous and when

Use this Blank for Solution Analysis Information

Fill in all items if possible.

Date .....

Name ..... Class of work being plated: .....
Address ..... Volume used: .....
Employed by: ..... Solution depth: .....
Kind of solution: ..... Cathode surface, sq. ft.: .....
Tank length: ..... width: ..... Kind of anodes: .....
Anode surface, sq. ft.: ..... Distance from cathode ..... Original formula of solution: .....

REMARKS: Describe trouble completely. Give cleaning methods employed. Send small sample of work showing defect if possible. Use separate sheet if necessary. _____

NOTE: Before taking sample of solution, bring it to proper operating level with water; stir thoroughly; take sample in 2 or 3 oz. clean bottle; label bottle with name of solution and name of sender. PACK IT PROPERLY and mail to METAL INDUSTRY, 116 John Street, New York City.

the work is placed in a low pH solution such as described is being used for the subsequent nickel, then the zinc will be attacked through the pores of the copper and result in a poorly adherent nickel at those points. A tin dip is not recommended for zinc die castings as the tin causes deterioration of the die casting alloy with resulting brittleness and loss of strength of the metal.

Blistering may also be due to improper cleaning or pickling. Cleaning should not be too strong or too long and discoloration of the zinc must be avoided. Excessive cleaning will cause as much trouble as insufficient cleaning. In order to thoroughly remove cleaner from the metal, a warm water rinse is desirable followed by running cold water rinse. The acid dip may be 1% hydrofluoric acid or 5 to 10% hydrochloric acid. Rinsing after acid should be done very thoroughly as any acid film remaining on work will be reacted upon by the cyanide copper solution and produce a film that causes blistering. The acid rinse is preferably not the same rinse used after the cleaner.

A water rinse followed by a light acid dip can be used after the cyanide copper and before nickel although a good dip before nickel is the use of some regular nickel solution in a crock held at a pH of 5.2, and transfer directly from this to the plating solution.

—G. B. H., Jr., Problem 5,619.

Copper on Antimonial Lead

Q.—Will you please advise us why, after we have plated lead and antimony parts in copper, after a period of about three months or better the copper disappears.

The copper plate is well protected by a top coat of lacquer, and we can't seem to locate where our trouble lies. The composition is 97% lead and 13% antimony.

A.—The action in this case is the gradual absorption, or diffusion of the copper into the lead-antimony casting.

The simplest remedy is to apply a heavier copper plate. A copper thickness of .0003" is normally considered sufficient to insure against the diffusion proceding to point where the surface finish is effected.

—G. B. H., Jr., Problem 5,620.

Spotted Chromium

Q.—Am sending a sample of a strainer grate that we are having trouble in plating.

This piece was cleaned, copper flashed and given a good coat of nickel before it was chrome plated, but it seems that about half of them come out of the chrome spotted as this one is.

We have tried our chrome tank at several different temperatures but it does not seem to help. No other work we do comes this way; this seems to be the only piece we have trouble with.

A.—The trouble appears to be due to the condition of the nickel surface before applying the chrome plate. The nickel may be passive if excessive pressure is used on the coloring wheel due to the high heat developed. This is especially noticeable on pieces of light section as they will heat up more rapidly than heavy work.

The remedy can be tried of cleaning the nickel in an electric cleaner, direct current, which will also aid in activating the surface. This can be followed by a dip in strong sulphuric acid solution, rinse, and chrome plate.

Some help may also be had by using a coloring composition with a different grease content or by coloring with a fine silica composition. The silica composition will clean off more readily than a lime compound.

Above conclusions assume that the chrome solution has been checked and found to be in good condition.

The method of racking is another factor affecting the chrome finish. On a piece such as the sample submitted the contact should be made in the center so as to obtain good current distribution.

—G. B. H., Jr., Problem 5,621.

Spotted Zinc Plate

Q.—We are sending you herewith a small bottle of cyanide of zinc solution which you will treat as you know best. Is this solution of proper strength for hot rolled steel? Our zinc deposit is rough and black spots appear here and there. Perhaps you can tell us how you clean this work before it is plated.

A.—The composition of the sample submitted is:

Zinc	2.81 ozs./gal.
Total sodium cyanide	6.22 ozs./gal.
Sodium hydroxide	5.43 ozs./gal.

A zinc cyanide solution that gives good results is composed of:

Zinc cyanide	8 ozs./gal.
Zinc	0.44 oz./gal.
Sodium cyanide	3 ozs./gal.
Sodium hydroxide	7 ozs./gal.

The solution submitted can be brought up to this strength by adding 3¼ ozs./gal. of zinc cyanide, 1¼ ozs./gal. of sodium cyanide and 1½ ozs./gal. of caustic soda.

The spots on the work may be due to impurities floating in the solution or to improper cleaning or pickling of the steel. Kindly submit a sample of the defective work for examination.

—G. B. H., Jr., Problem 5,622.

Streaky Cadmium Plate

Q.—A great deal of our business in cadmium plating is composed of machinery parts, which have been welded. While we have no difficulty in applying plate on the weld, itself, there is always a streak that appears to be unplated, and we think it must be the flux used in welding.

Can you suggest some manner of treatment, so that the flux will take the plating, the same as the rest of the parts?

Also, will you be good enough to advise us the most economical way to recover cadmium oxide salts from a plating solution? Analyses show approximately 6 ozs. of cadmium salts to the gallon of solution.

A.—It is necessary to remove the flux in order to deposit the coating of cadmium on the metal surface. There is a possibility that the flux is not the cause of streak mentioned, but rather the oxide film produced by welding.

It is suggested that work be pickled in a 30% muratic acid solution at 160 deg. F. using an inhibitor to prevent metal solution. Such a solution will only attack oxide film and remove it. Rinse work thoroughly in clean cold running water prior to plating.

It is not possible to recover cadmium salts in a cyanide solution as cadmium oxide. In a cyanide solution, cadmium oxide is converted into complex cadmium cyanide salt. While this salt could be converted back to cadmium oxide, the process would be rather complicated and expensive.

—G. B. H., Jr., Problem 5,623.

Metal Casting Digest

Short abstracts of articles of interest to practical non-ferrous foundrymen and metallurgists

By H. M. ST. JOHN
Associate Editor

Interchange of Tin in Red Brass Brands Rg 5 and Rg 9, Particularly with Antimony (Replacement of Tin by Antimony). W. Keese. Z. Metallkunde, Vol. 28, page 58 (1936); Chemical Abstracts, April 10, 1937, col. 2153.

Antimony is not a satisfactory substitute for tin in red brass grades Rg 9 (85% copper, 6% zinc, 9% tin) and Rg 5 (85% copper, 7% zinc, 5% tin, 3% lead) because it appreciably reduces the tensile strength, elongation and hardness. Heat-treating the antimony alloys further decreases the values of these properties. While the strength and hardness are about equally impaired by heat-treating, the reduction in elongation of the 5% antimony alloys was twice that of the 2.5% antimony alloys.

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Gating in Relation to Composition. Metal Industry (London), April 16, 1937, page 461.

Abstract of paper by J. M. Douglas before the Scottish Branch of the Institute of British Foundrymen. In small castings the gate should feed as well as run the casting. In general, for gun metal, large gates give sound castings over the whole range of casting temperature; medium-sized gates give sound castings at higher temperatures and unsound castings at lower temperatures; small gates give unsound castings at the higher temperatures and may give sound castings at lower temperatures. For the yellow brasses large gates must be used and the same is true of the low-nickel nickel silvers. With the high nickels heavy feeding heads are required.

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Copper and Copper-Base Alloys. R. A. Wilkins. Mech. Eng., Vol. 58, page 809.

A review of the properties of copper alloys, giving 117 references.

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Gas in Nonferrous and General Foundry Work. A. E. Wilson. Gas World, Vol. 106, page 24 (1937).

Brief review.

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Equipment for Routine Creep Tests on Zinc and Zinc-Base Alloys, and an Example of its Application. J. Ruzicka. Metals Technology, April, 1937, T. P. No. 806.

Conclusions:—(1) The ordinary tensile test and other routine tests do not reveal differences in strengths of materials as well as do tests at constant load and slower rates. (2) Constant-load, slow-rate tests are best made in creep equipment on standard specimens. Tests in such equipment, unlike "practical" comparison-tests, are readily standardized and yield absolute data of general value. (3) The particular creep equipment described in this paper offers a means of making such creep tests accurately, conveniently and cheaply.

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Recent Progress in Aluminum Casting Alloys. A. G. C. Gwyer and H. G. Dyson. Aluminum & The Non-Ferrous Review, April 1937, page 215.

A paper read before the International Congress in London of the International Association for Testing Materials. Specifications, new alloys and new applications are discussed. Among the new alloys is Aeral, a heat-treated alloy containing cadmium, which is added to improve corrosion resistance by its cathodic action.

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Corrosion Resisting Cast Aluminum Alloys. Sterner Rainer. Aluminum & The Non-Ferrous Review, April, 1937, page 219.

Magnesium is the most important element for promoting corrosion resistance. Among the heat-treatable alloys those containing small percentages of Mg_2Si are most resistant.

• • •

Notes on the Hardness and Conductivity of Heat-Treated Copper Castings Alloyed with Zirconium and Beryllium. G. F. Comstock and R. E. Bannon. Metals and Alloys, April, 1937, page 106.

Zirconium hardens copper without entering into solid solution, thus does not so greatly affect the electrical conductivity. The alloy containing approximately 1.5% zirconium, age-hardened, has a Rockwell E hardness of 76, a conductivity of 75.5%. As the zirconium content was increased to 3.25%, the hardness increased to 84.5, the conductivity dropped to 55%. When zirconium and beryllium were used in combination, in proportions of 1.5% each, a maximum hardness of 116½ was obtained but the conductivity was only 36.2%. The alloy containing 1.5% beryllium alone had a hardness of 116½, conductivity 36.1%. It was found, however, that the alloys containing zirconium with the beryllium retained their hardness better at high temperatures.

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Hardenable Copper. Nickel-Tin Bronzes. Part VII. Temperature Stability of the Hardness. E. Fetz. Z. Metallkunde, Vol. 28, page 350 (1936); Chemical Abstracts, May 10th, 1937, col. 2979.

The hardness of a variety of nickel-tin bronzes, which had been water-quenched, air-cooled, and aged to maximum hardness, was determined for annealing times up to 5000 hrs. at 250°C, 2000 hrs. at 300°, 350° and 400°, 1000 hrs. at 450° and 100 hrs. at 500°, 560° and 600°. The stability of these alloys is greatest when the alpha solid solution has decomposed completely and tensile tests show that mechanical properties are the same for aged and over-aged alloys of the same hardness. The long-time heating tests show that softening is independent of the pretreatments indicated above. The most stable compositions are those with the highest nickel content, consequently the highest melting point. Under given conditions the hardness usually reaches a steady value.

Modern Production Equipment

New processes, machinery and supplies for metal products manufacturing and metal finishing

Automatic Temperature Control

The Powers Regulator Co., 2720 Greenview Ave., Chicago, Ill., has equipped a Bonderizing tank in its plant with one of their own automatic controls. The following results are reported.

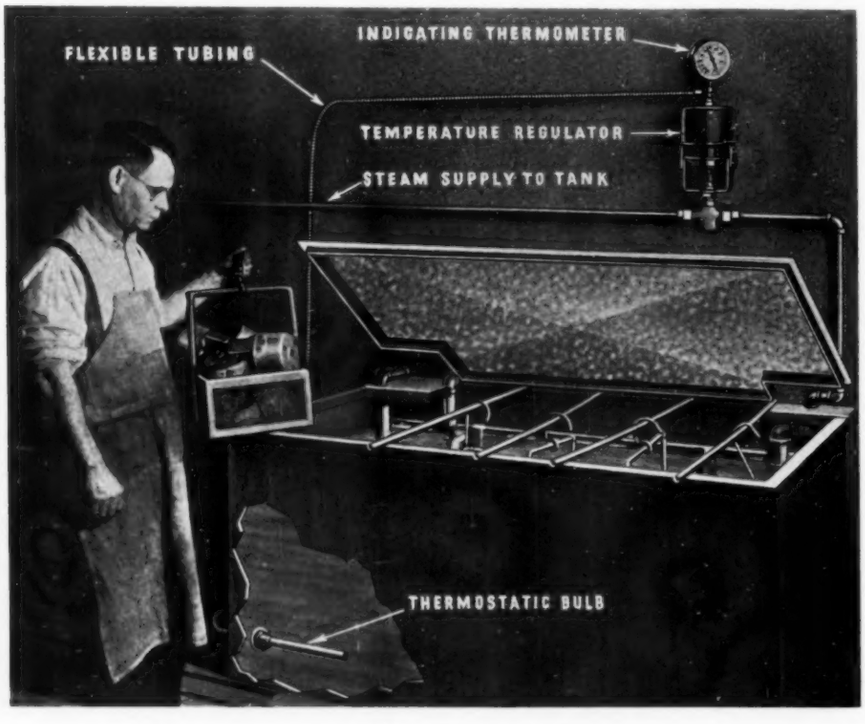
The control accurately maintains the Bonderizing solution at 208 deg. F. (It can be adjusted to maintain any other temperature if desired).

By preventing the under- and over-heating which invariably results from hand control it saves labor, steam and the chemical used in the solution, and speeds up the output of the operator.

Overheating agitates the solution, disturbing sediment that may accumulate in the tank so that it deposits on products being processed, making extra wiping labor. By preventing overheating, the Powers Regulator enables the operator to observe the action of the Bonderizing solution, which is impossible when the solution is muddy with agitated sediment stirred up by overheating and the excessive circulation which results.

Uniformity of temperature aids toward producing a uniform coating and saves time and labor.

Being a self operating regulator, there is no auxiliary power such as compressed air or electricity required for its operation. An indicating dial thermometer which is built in the regulator correctly indicates the temperature of the Bonderizing solution. The Powers high pressure steam trap drains out the condensate from the heating coils, to assure maximum speed and efficiency in heating.



Bonderizing tank equipped with Powers automatic temperature control

Speed Lathes

A line of speed lathes has been developed especially for finishing, polishing or lapping small parts, by the Schauer Machine Company, Cincinnati, Ohio. It is recommended especially for the final operations on ball bearing races, headless set screws, shafts, screw machine products or for burnishing wire drawing dies, metal spinning, etc.

Special features of these lathes are: automatic brake which is applied the instant that the operating current to the motor is cut off and stops the motor in two seconds when running at high speed and one second at low; double row ball bearings on chuck and rear ends of spindle, dust-proof and operating in grease; 2-speed motor, ¼, ½ or 1 H.P., to operate continuously without overheating.

A variety of accessory equipment is provided to suit the individual needs of the user.

Latest Products

Each month the new products or services announced by companies in the metal and finishing equipment, supply and allied lines will be given brief mention here. More extended notices may appear later on any or all of these. In the meantime, complete data can be obtained from the companies mentioned.

Hydraulic Universal Grinding Machine, "Multipurpose." Time saver on odd jobs or production work. Norton Co., Worcester, Mass.

Drinking Fountains for Factory and Office; six new styles; modernistic, "easy-to-keep-clean" design. Crane Co., 836 S. Michigan Ave., Chicago, Ill.

Baking Oven; sectional construction, individual heat generators. Baking or roasting temperatures up to 1500 deg. F. Lancaster Iron Works, Inc., 124 E. 42nd St., New York.

Grinder for Sharpening Carbide Tools. Equipped with two wheels, one for roughing and one for finishing. Baldor Electric Co., 4357 Duncan Ave., St. Louis, Mo.

Taylor Self-Centering Scroll Chucks; all the moving parts hardened and ground; especially adapted for use with high speed machine tools. George Scherr Co. Inc., 128 Lafayette St., N. Y. City.

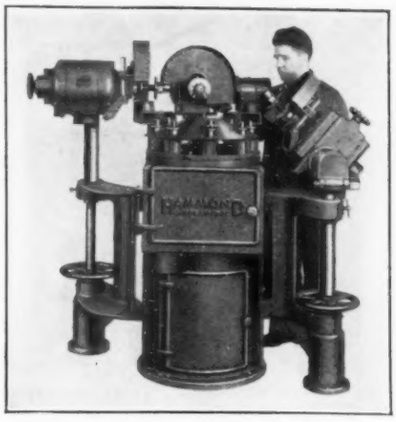
"Shorty" Ball Bearing Electric Drill; 3/16-inch and ¼-inch sizes. Power, compact design, light weight and ability to work "around corners." Black and Decker Mfg. Co., Towson, Md.

Haynes Stellite Cutting Tool; cobalt-chromium-tungsten alloy—"Haynes Stellite-2400" for cutting at increased speed without sacrifice of feed or depth of cut. Haynes Stellite Co., 205 E. 42nd St., New York City.

Automatic Polishing and Buffing Machine

A new automatic polishing and buffing machine, Type J has been brought out by Hammond Machinery Builders, Inc., Kalamazoo, Mich. This machine is equipped with three motor-on-spindle polishing or buffing heads, and an indexing work table with eight revolving work spindles. Three spindles at the operator's station cease revolving for loading and unloading. The machine is recommended for a large variety of die castings, small gears, light brass parts and other kinds of circular work up to 5" in diameter.

The machine has a rugged cast iron frame, aluminum tables and nickel-chromium steel shafts with sealed ball-bearing mountings. The drive is V-belt from ½ H.P. motor located in the base. Equipped with wheel guards and exhaust type dust collectors.



Hammond Type J automatic polishing machine

Lively Exhibit of Metal Finishes

Roxalin Flexible Lacquer Company, Inc., Elizabeth, N. J. has set up an unusually striking exhibit at Metals & Plastics Bureau, International Building, Rockefeller Center, New York City.

Their booth embodies an exhibit of finishes, lacquers, enamels and synthetics for metal, wood and other bases. A group of illustrations show a "twisting and bending" test for lacquers; also photos of the Trail Blazer, their salesman on wheels, carrying more than 200 samples of products finished with their materials. They also show steel tubes coated with Roxalin flexible finishes which the visitor is invited to pick up and bang together to prove that the finish will not chip, flake or peel.

A "live" feature of the exhibit is a revolving four-sided drum which can be set in motion by the means of a switch. This drum shows the following products:

1. Roxyn C, the new synthetic finish which is said to air-dry dust-free in lacquer time and short-bake to produce a tough, porcelain-like finish which is so highly flexible that it can be blanked and formed.

2. "New Fashions in Finishing," a combination of Roxyn C, described above, and Rincon-Trol, a wrinkle finish which, it is stated, creates beautiful, uniform texture surfaces where size of wrinkle and crater are easily controlled. Rejects are said to be greatly curtailed and repair work easily accomplished without stripping.

3. Flat sheets finished with Roxalin flexible finishes and then blanked and formed. The finish does not chip, flake or peel; stands up against abuse in handling in warehouse and shop; does not become brittle on ageing; tested in steam at 212° F. for two years without loss of flexibility or adhesion. It is this air-dry finish, applied directly to bare clean metal without primer, that is offered to companies to overcome the problems imposed by limited oven capacity. These flexible no-bake finishes, it is claimed, possess unusually excellent adhesion and do not brittle on ageing.

4. Metal Edging for Boxes. Steel strip finished, re-rolled, fed through a stapler which cuts strip to the right length and clinches it onto box corners without brittling, loss of flexibility or adhesion during all these operations.

Conveniently at hand is a dispenser from which the visitor can pick packets containing various finishes on metal strips for twisting, bending and fingernail tests.

Roxalin exhibit of metal finishes

Utility Paint

An exterior utility paint which is said to be self-priming on galvanized iron has been brought out by Somay Products, Inc., Miami, Florida. This paint, it is stated, permanently adheres to old or new matte or spangled galvanized iron without pretreatment of any kind. It is also said to give complete coverage over clay-type emulsified asphalt, hard-drying asphaltums, tile, slate, cement-asbestos and composition roofings, in one coat without any bleed-ups.

On masonry, this paint is claimed to be an excellent weather-resisting primer or finishing coat and to form an ideal intermediate film between masonry and oil paint.

Protective Coatings

Two new types of protective coatings are announced by the Harrington Paint Co. Inc., 1630 Collamer Ave., East Cleveland, Ohio, for protection against acid and alkali attack. The first product is known as Galvide to give perfect adhesion to galvanized iron without any acid etching or special processing before application. The other product, Rust-Eeter No. 100, is a rust conversion primer to give protection against further oxidation.

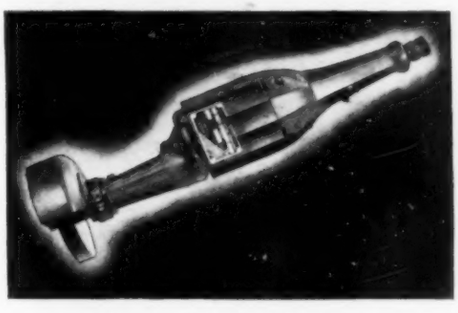
The manufacturers state that the surface to which this material is to be applied does not need to be clean of rust before application. Rust-Eeter No. 100, it is claimed, also provides protection against the attack of any inorganic acids and alkalies.

Portable Electric Grinders

The new portable electric grinders have been added to the line of the Independent Pneumatic Tool Co., 600 W. Jackson Blvd., Chicago, Ill., designated Thor U54 and Thor U55.

These grinders are featured by the application of a flexible shaft on the spindle support to minimize vibration set up by the grinding wheel and reduce machine wear. Armature windings and the motor commutator are protected against shock. Shafts ride on ball bearings and a labyrinth grease seal is provided on the outer end of the spindle support. This seal is reinforced with a steel hub around which the guard is clamped. Gears are spiral helical design, made of heat-treated alloy steel. Induced ventilation prevents overheating.

The smaller of the two machines is known as U54, carries a 4-inch by ¾-inch wheel, weighs 10 pounds with its grinder guard, measures 19½ inches in overall length. The larger machine U55, carries a 5-inch by ¾-inch wheel, weighs 10¼ pounds with its guard, is the same length, 19½ inches, as the smaller unit. Both grinders have ½-inch spindles, are equipped with straight handle switches, wheel guards and 10 ft. of cable.



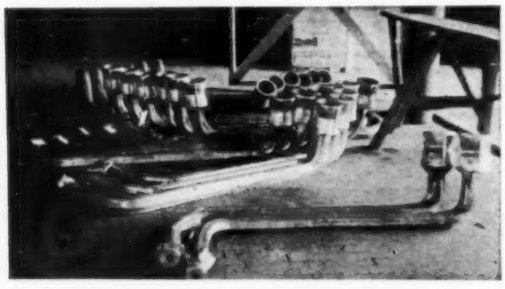
Thor portable electric grinder

Corrosive Liquid Equipment

Heil and Company, corrosion engineers, 3088 W. 106th St., Cleveland, Ohio, are manufacturers of steam, gas, and electric tank heating equipment, immersion coils, etc., for corrosive liquids used in metal pickling, electroplating and similar plants. They make jets for the direct introduction of live or exhaust steam into a bath or solution as an efficient heating medium, as well as for a means of agitation. The company makes tellurium lead, steam jets for sulphuric acid solutions. For nitric, hydrofluoric and muriatic acids, either alone or mixed such as in stainless steel pickling, they offer their B type Nocorodal jets.

Heil and Company manufacture pipe coils for heating by the use of steam or hot water, made of steel, lead, Monel, and stainless steel. They also make an electric heater where steam heat is not available or where a portable unit is desired, which can also be used as an accessory unit to help speed up the initial heating period; furnished sheathed with lead, Monel or stainless steel. Gas immersion heating, through flue coils immersed near the bottom of the tank, is also a part of their service. The flue coils can be furnished in steel, lead, copper. Monel, stainless steel or Nocorodal for severe chemical service.

Above—Heil electric heater



Left—Heil steam jets

Portable Travelling Oven Temperature Recorder

A new portable recording thermometer for use in travelling baking ovens, finishing ovens, enameling ovens, etc., has been developed by The Bristol Company, Waterbury, Conn.

The instrument passes through the oven or the conveyor with the work and gives a continuous record of the temperatures to which the heated product is subjected as it passes through the oven. These thermometers are especially recommended for large enameling ovens in plants where electric and gas heaters, and ice refrigerators are manufactured. They are also said to be extensively used in ovens for treating the finish on automobile bodies, in maintaining the proper temperature for the color of the finish desired.

Bristol portable travelling oven temperature recorder

Bristol's Portable Recording Thermometers are light in weight. They are compact and self-contained as shown in the illustration. They record on an 8-inch round chart for 24-hour or 7-day clock rotation.

Polishing and Buffing Composition

The Purico Wonderbar polishing compositions manufactured by the Puritan Manufacturing Co., Waterbury, Conn., are distributed by Divine Brothers Company, Utica, N. Y. These polishing compositions are "presaponified." They are according to the manufacturer, soluble in water and wash off easily because the natural action of saponification in water removes all grease and other foreign materials. It is claimed that scrubbing or brushing the work becomes unnecessary, thus saving a considerable amount in labor cost; also that the time required for washing is reduced.

The Purico line includes tripolies, silica compositions and polishes for stainless and molybdenum steels.

Super Refractories

A new series of super refractories adapted particularly for use in high temperature furnaces and in contact with corrosive materials has been developed recently at Mellon Institute, Pittsburgh, Pa., according to an announcement made today by Dr. E. R. Weidlein, Director of the Institute. These new refractories, which have been given the trade name "Monofrax," were evolved through the research of Dr. A. P. Thompson, incumbent of the Abrasive Fellowship, in cooperation with the research laboratories of The Carborundum Company.

"Monofrax" blocks are cast by methods similar to those employed in foundry practice, from a melt produced in the electric furnace. Because of the non-metallic nature of their constituents, however, much higher temperatures are required than in casting iron, and the problems involved are therefore much more complex. Through the use of unique methods of forming the blocks, these obstacles have been largely overcome, with the result that this material is now available commercially.

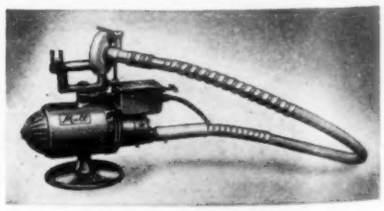
"Monofrax" refractories have, it is stated, shown extraordinary resistance to erosive and corrosive attacks at high temperatures. They have proven to be particularly suitable for those uses in which a refractory is in contact with a high temperature melt.

The original idea that electricially fused materials might be suitable for use as refractories was first conceived by F. J. Tone, President of the Carborundum Company, many years ago.

Flexible Shaft Grinders

The Mall Tool Company, 7740 S. Chicago Ave., Chicago, Ill., has recently introduced a new grinder for heavy industrial applications. This grinder operates at high speeds to provide fast cutting action. It is equipped with geared head to deliver 4500, 5500 or 7000 r.p.m., as desired and can be furnished with angle or straight spindles for all types of grinding, sanding or polishing.

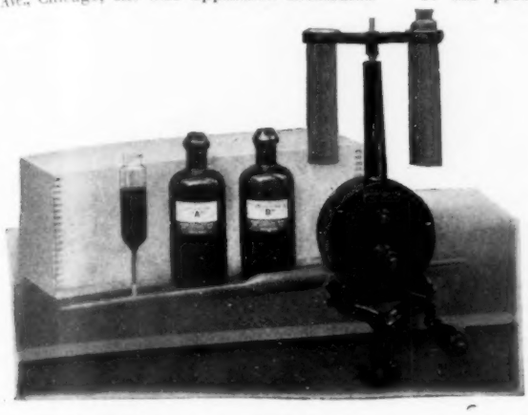
Bases can be furnished of round steel or with high or low casters as desired.



Mall flexible shaft grinder

Sulphate Test Set

Chromium plating solutions can be accurately analyzed for sulphate by means of their test set, according to the manufacturers, Kocour Company, 4724 S. Christiana Ave., Chicago, Ill. The apparatus illustrated



Kocour test set for sulphate analysis of chromium solution

it is stated, enables a non-technical person to determine the sulphate content quickly and accurately.

Using the small pipette, 5 ml of solution "A" is introduced into one of the centrifuge tubes. Using the large pipette, 20 ml of the solution to be tested is added to it and the mixture shaken. Now 5 ml of solution "B" is added and the tube corked and shaken vigorously for one minute and then allowed to stand for 5 minutes. It is then placed in the centrifuge and whirled until the volume of the precipitate formed in the stem of the tube becomes constant. Usually this takes less than one minute.

The stem of the tube is graduated so that each division represents .02 (two hundredths) of an ounce (avoirdupois) per gallon of sulphate. Major divisions on the stem each represent 0.1 ounces per gallon of solution.

Mechanical Plating Barrel

Chas. F. L'Hommedieu & Sons Company, 4521 Ogden Ave., Chicago, Ill., are the manufacturers of the new mechanical plating barrel, illustrated below. The features as given by the manufacturer are the following:

Easy, quick and safe operation in raising and lowering the cylinder and in closing and removing the door to the cylinder.

Strong, reinforced rubber cylinder will carry heavy loads and withstand the chemical action of plating solutions.

Haveg acid resisting pipe

Choice of several types of danglers in cylinder to insure good electrical contact with various shapes of work. Danglers are chrome plated to minimize their being plated, and can be quickly removed for cleaning when necessary.

Metal gears and reinforcements are anodically charged to prevent their being plated.

Cathode connections to cylinder are well insulated and protected at all points against strain or break.

Black Metal Wrap

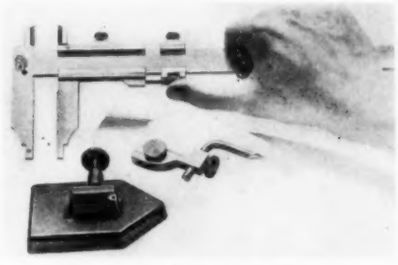
A new quick drying coating used to protect chrome plated, lacquered and enameled parts as well as bare metal during handling, shipping, storage and export has been placed on the market by Wayne Chemical Products Co., 9475 Copeland St., Detroit, Mich. This product is a black liquid and can be applied by spraying, dipping or brushing on metal parts. It is said to dry very quickly into a tough film of shiny black color and to protect the parts against rust, scratches, finger marks and the ordinary mars received during handling and shipment. The manufacturers state that it can be easily removed by washing with common solvents including mineral spirits, gasoline, kerosene and carbon tetra chloride. When a light film is desired Black Metal Wrap may first be diluted with gasoline naphtha or carbon tetra chloride.

The use of Black Metal Wrap is said to eliminate much of the expense of paper, tape, pads, corrugated board, etc. as well as the labor required for present methods of wrapping metal parts to protect them from mars and scratches.

Improved Calipers

A new tool has been added to the line of Mauser vernier calipers handled by George Scherr Company, 128 Lafayette St., New York City, designed particularly for tool makers. The new caliper, graduated in 1/1000″ and 1/128″, is known as type No. 537, with height gauge combination. It comes in three sizes with measuring capacities of 7″, 9″ and 11″. A base is furnished which, if properly attached, transforms this caliper immediately into a height gauge.

The scribing attachment is a separate unit for attachment to the upper jaw. An advantage claimed is that the steel point is



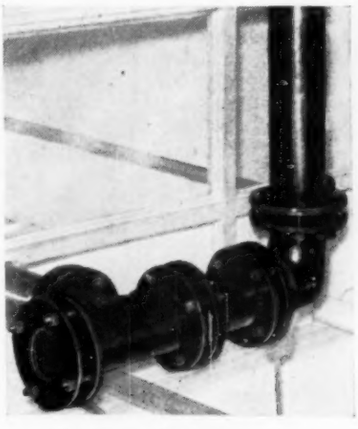
Mauser No. 537 calipers

adjustable, making it possible to set the height gauge at an even figure of the scale when starting to measure, thus saving time and calculation.

Acid Resistant Pipe and Fittings

A line of standard pipe and fittings, valves and fume duct has been introduced by the Haveg Corporation, Newark, Dela., which are molded from a mixture of a special acid-washed asbestos and a synthetic phenol formaldehyde resin. This composition, it is stated, has strength, toughness and durability, together with excellent corrosion resistance, not only on the surface but throughout the entire mass of the material.

Haveg, it is claimed, is exceptionally resistant to practically all acids and salts, to chlorine, to the weaker bases and to many

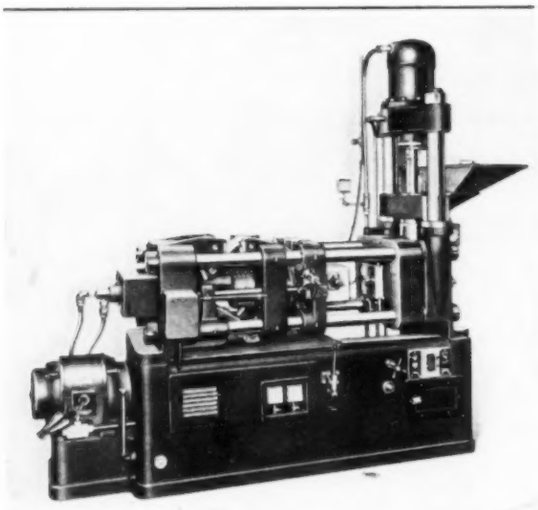


Haveg acid resisting pipe

solvents and other chemicals. It is not affected by rapid temperature changes and can be used continuously at temperatures as high as 265 deg. F. No insulation is called for as the thermal conductivity is low. Pipe and fittings are supplied in standard sizes from ½″ to 12″; fume duct from 2″ to 30″. Bulletin A-1 gives full details and a table of chemicals satisfactory for use with Haveg.

Injection Molding Machine

Announcement has been made during the past month of a new injection molding machine by the Index Machinery Corporation, 49 Central Ave., Cincinnati, Ohio, who are sole distributors for it in the United States and Canada. Fully automatic, this new I.M.C. Lester designed injection molding machine, it is claimed, meets the requirements for the injection of larger articles with a maximum weight of 6 ounces per casting.



I.M.C. Lester-designed injection molding machine

The machine operates either automatically or semi-automatically. For the semi-automatic operation of the machine a single operating lever is provided; this lever is conveniently located to insure operating efficiency. The full-automatic operations of the machine are controlled by two electric clocks.

The molds are closed by hydraulic power, operating toggle joints, and these joints are firmly locked by tapered surfaces when the mold is closed.

Another new feature of this equipment is the adjustment of the mold on the tie bars. This is accomplished through the use of a worm and worm wheel by which the die plates are advanced uniformly, to insure absolute parallelism of the die plates on the tie bars at all times. The tie bars are 3¼″ in diameter.

The entire heating cylinder is chromium plated and is constructed in that all adjustments can be readily made; the entire heating cylinder assembly swings away from the machine, affording exceptionally easy accessibility for adjustments.

The injection stroke of 8½″ is accomplished in 3 seconds. The base of the machine serves as an oil reservoir.

"Strip" Heater and Busbar

One of the most recent additions to the line of the General Electric Co., Schenectady, N. Y., of small heating units is a "strip" heater with offset terminals. The offset-terminal construction is said greatly to facilitate wiring and arrangement of strip heaters in series. The new units, which, except for their terminals, are similar in construction to standard G-E strip heaters, are available in convenient lengths and ratings.

As a further aid to easy wiring, General Electric also has developed a busbar for use with the new heating unit. Holes punched in the busbar at frequent intervals fit the offset terminals and allow a wide choice of spacing of the heaters.

G. E. electric "strip" heater

High Temperature Electric Furnace Element

An electric furnace element capable of operating at 3000° F. is to be exhibited under operating conditions in Pittsburgh beginning the first week in November. The element was developed by Dr. Paul Schwarzkopf, a pioneer in powder metallurgy, in his laboratories at Reutte, Austria. The makers claim that such elements, after operating 1,400 hours at a temperature of 3000° F., have shown no evidence of deterioration. As a result of tests made in Europe, the element appears to be resistant to hydrogen, oxygen, hydrocarbon, sulphur, and its combinations. The element holds out much promise of being used in air, neutral, reducing and oxidizing atmospheres, in vacuum, or even in sulphurous atmospheres. It should, therefore, be suitable for use in furnaces, as well as in the metal industry. Professor W. Trinks of Pittsburgh has arranged the details of the test.

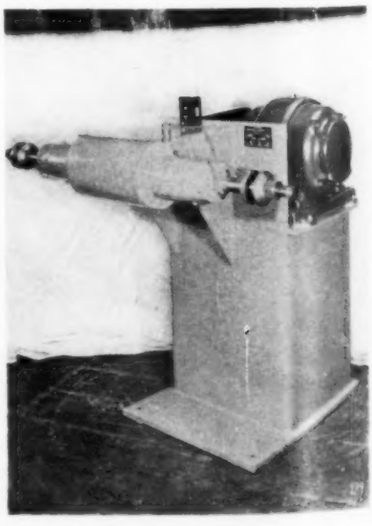
If the element has the characteristics claimed for it, it will open a much larger field for the use of industrial furnaces and might in time even be used in the electric kitchen stove, where it would give the electric stove the quick cooking characteristics of the gas stove. The present tests, however, will be confined entirely to the use of the new element in industrial furnaces. The elements now in use in electric furnaces can not reach higher temperatures than about 2400° F.

Arrangements for the testing were completed in behalf of Dr. Schwarzkopf by Pierce T. Wetter, American Cutting Alloys, 500-5th Ave., New York City. Mr. Wetter stated that manufacturers and users of electric furnaces would be invited to check the tests and that H. M. Mawhinney, Consulting Engineer of Salem, Ohio, has been retained to work with furnace manufacturers in studying the new element to see its application in industrial furnaces. If the element fulfills the claims made for it, the manufacture in this country will be started.

Buffing and Polishing Machine

A newly designed buffing and polishing machine designated as Crown No. 89 has been placed on the market by Crown Rheostat & Supply Co., 1908 Maypole Ave., Chicago, Ill. The outstanding features of this machine are embodied in its new type of construction. It is made entirely of welded steel, has a 14″ overhang and V-belt drive. The unusual feature is the placing of the motor which is set off the floor, at a level sufficiently high to make it easily accessible and convenient for the operator in case it is necessary to make adjustments or repairs.

The weight of the machine is 1,000 pounds.



Crown No. 89 buffing and polishing machine

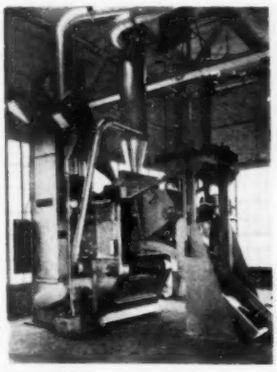
36″ x 42″ Wheelabrator Tum-Blast

A new model 36″ x 42″ Wheelabrator Tum-Blast has been announced by The American Foundry Equipment Company, 408 S. Byrkit Street, Mishawaka, Indiana.

Many new features have been incorporated in the design of this centrifugal abrasive blast cleaning equipment. Fabricated steel side frames replace cast iron frames formerly used, making the unit much stronger. Welded corner and joint construction assures extra ruggedness and dust-free operation.

Centrifugal force is utilized in whipping steel abrasive onto metal pieces being cleaned; a gentle tumbling and complete exposure of all parts in the blasting zone being attained through the use of an endless conveyor apron.

An improved suction type abrasive separator is included at the elevator head as standard equipment on the new model. This separator, it is claimed, effectively keeps the abrasive clean by removing dust and broken down abrasive after burned molding sand, forging scale and other foreign material is extracted by the rotary screen.



American 36″ x 42″ Wheelabrator Tum-Blast

The new Wheelabrator Tum-Blast, with the standard conveyor, will clean metal parts weighing up to 30 pounds. Pieces weighing as much as 75 pounds can also be cleaned, when the machine is equipped with a heavy-duty conveyor.

Disc Grinders

The Cincinnati Electrical Tool Co., a division of The R. K. LeBlond Machine Tool Co., Cincinnati, Ohio, has just announced the addition of several sizes of disc grinders to their general line of such equipment.

These grinders may be had in the double and disc type as shown in the illustration or with a disc on one side and a conventional type grinding wheel and wheel guard on the other side.

On the double disc grinder a table with hand lever feed is regularly supplied on the right hand side of the machine with a plain table on the opposite side but this equipment may be changed to suit individual requirements. On the combination type unit a table with hand lever feed is regularly furnished on the right-hand side, with a fully enclosed safety wheel guard, for the grinding wheel, on the other.

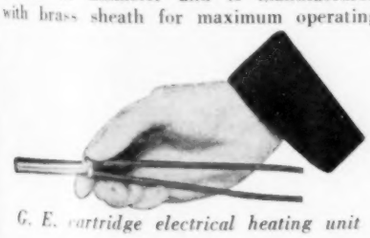
The steel discs furnished as standard equipment may be had for either gluing on abrasive discs or properly drilled for mounting steel-back abrasive discs. A disc press can be supplied for gluing abrasive discs to steel discs.

Cincinnati disc grinder

The motor supplied is of the fully enclosed type with magnetic starter with both overload and no voltage protection and push button control.

Smaller "Hot Spots"

Where a "spot" of heat is required within a limited space, a new small cartridge-type heating unit, recently announced by General Electric Co., Schenectady, N. Y., is said to offer many advantages. The new unit, the smallest of the G-E line, is only ⅜ in. in diameter and is manufactured with brass sheath for maximum operating temperature of 750 degrees F. It is recommended as especially convenient for built-in applications and can be quickly installed. It is available in ratings of 30, 75, and 90 watts at 115 or 230 volts, a-c or d-c.



G. E. cartridge electrical heating unit

Chlorinated Rubber Base Coatings

Mayco protective coatings, manufactured by May Products, Inc., 198-212 Niagara St., Newark, N. J., containing chlorinated rubber with acid and alkali-resistant pigments and plasticizers, are now offered for the effective protection of plant and equipment against corrosion. Various types are available which are claimed to be extremely moisture, acid and alkali-proof. Practical long range tests are said to have proved the value of these coatings in the effective protection of metal, wood and concrete surfaces against corrosive attacks of acid and alkali vapors and liquids, and remarkable results are reported from users in the equipment and construction fields regarding the durability and resistance of these coatings to most severe corrosion conditions.

Inspection Without Damage

A method of inspecting machine parts for hidden flaws without injuring or changing them has been developed by the General Electric Company, Schenectady, N. Y. According to J. A. Sams of the Company's Works Laboratory staff, the method depends on the principle that any substantial change in the constitution or state of magnetizable material will be reflected in its magnetic characteristics.

"A constant magnetic field is produced so that it penetrates through the entire thickness of a small area of the part to be inspected," says Mr. Sams. "The part is slowly revolved so as to change continuously the section within the field, until the whole part is magnetically explored. Imperfections such as voids or nonhomogeneous areas in the interior betray themselves by producing disturbances in the magnetic field at the surface of the part.

"Magnetic search coils are mounted close to this external surface. Any sudden change in the magnetic linkage, created by a discontinuity in the metal of the part, produces a corresponding sudden electric voltage in the external measuring circuit. The imperfection is detected and the defective part is discarded."

Electric Babbitt Melter

The illustration shows the Trent 1000-lb. electrically heated babbitt pot, for single phase. The equipment is made portable by mounting on a substantial platform with wheels. The temperature is controlled by means of a thermostat and magnetic switch which are mounted on the truck.

The design of the pot follows closely the Trent standard design shown in Leaflet TD-11. Larger pots can be supplied of a similar nature, up to 1500 lbs. capacity of lead, suitable for voltages of 115 to 440. Manufactured by Harold E. Trent Company, 618-640 N. 54th St., Philadelphia, Pa.

Trent 1000 lb. electric babbitt melting pot

"Dual Control" Welder

An A. C. welder with separate voltage and amperage controls, enabling the operator to select the most desirable voltage for the amperage used on any job, has just been put on the market by Miller Electric Manufacturing Co., Appleton, Wisconsin. This welder, known as "Dual Control" furnishes, it is stated, practically unlimited current settings. It is said to be easy to operate; the three dials on the front of the cabinet are plainly marked; it is compactly built but heavily constructed for hard usage.

Built in 3 sizes with a current range from 10 amperes to maximum output that makes possible welding of sheet metal or heavy metal, this welder is equipped with wheels and a handle so that it is as portable as a truck. All three sizes have the same cabinet dimensions and vary in weight from 235 lbs. to 350 lbs.; furnished standard for 220 volts.

Miller "Dual Control" Welder

Wire Strapping Machine

A new and rapid selective-tension wire strapping machine actuated by one single stroke of its operating lever, is produced by the Gerrard Co., Inc., 2915 W. 47th St., Chicago, Ill.

After the wire is inserted through the machine and draped around the box to be strapped, the long tension handle on the left of the machine is operated back and forth until the required tension is obtained. One complete stroke of the center operating handle of the "N" follows. This twists the wire, forming the wire seal. At the same time the wire is cut and all parts automatically return to their original positions.

The "N" is primarily designed for the wire-strapping and reinforcement, as well as a protection from pilferage of light wood cases and heavy fibre and corrugated cartons. This reinforcement makes any container rigid and strong and able to withstand shipping abuse. Wire applied by the "N" model can be interlocked to prevent pilferage. At the same time the wire does not cut the cartons but clinches them firmly so that its tensioned pressure is firm enough to prevent slipping off, either by accident or on purpose.

Any weight carton or box can be reinforced by this machine.

Gerrard "N" Model wire strapper

Thread-Cutting Screws with Standard Machine Screw Thread

The Shakeproof Lock Washer Company, 2501 N. Keeler Ave., Chicago, Ill., has recently announced the development of a screw that actually cuts its own thread in metals and plastics of practically any thickness. Its patented, thread-cutting slot, plus a special hardening process, is said to eliminate the separate tapping operation normally required in the use of standard machine screws.

Another advantage claimed is that, should it ever be necessary to replace the screw, an ordinary machine screw of the same size will fit its threads. A free demonstration kit of Shakeproof thread-cutting screws, including an assortment of different sizes and complete instructions for testing, can be had by writing the Company.

Shakeproof thread-cutting screw

Automatic Bright Acid Dip Machine

A successful full scale bright dip machine was recently put in operation at the Belleville Base Works of the Westinghouse Electric & Manufacturing Company's Lamp Division, Bloomfield, N. J. After experimentation over a six year period, during which two smaller machines were built and operated, the company announced that several months of successful, profitable, and safe operation of its fully automatic machine has proven its worth, and presented a substantial cash award to the inventor and designer, F. A. Newcombe, Belleville Factory Engineer.

The machine, about 40 ft. long, is completely glass-enclosed. It automatically dips baskets of brass shells in several successive acid dips, in a number of wash solutions, and in a lacquer-soap compound, delivering the work bright, lacquered and dry at the end of the sequence. Automatic control of acid concentrations and proportions, and of lacquer-soap solution concentration is maintained within close limits by the use of very sensitive hydrometer floats. This eliminates acid-handling and keeps concentrations more nearly exact than was possible by hand. Incorporation of the lacquer operation in the same machine does away with one handling and any possibility of spoilage of work by oxidation.

The capacity of the machine is 250,000 lamp bases per hour. The work turned out by the machine is much more uniform than can ever be hoped for in the manual process, because of automatic control of solutions to within ½ degree Baume and to 0.05%.

The hand dippers wore rubber aprons, rubber boots, elbow-length rubber gloves, and goggles. They walked on acid-soaked duck-boards or in acid puddles on the concrete floor, swinging heavy baskets containing brass parts into wire baskets full of concentrated steaming acid. They were exposed to fumes, steam, scalding water and hot lye solutions. The acid baths often "went bad" without warning and work had to be redipped. The workmen were engaged continuously in labor that was not only dangerous but fatiguing and inimical to health.

The operators of the automatic machine wear neither gloves, apron, boots, nor goggles. They can dress in ordinary business suits. They are not exposed to splashing acid or alkali, or to fumes or steam. Duck-boards and acid-proof flooring are no longer needed.

F. A. Newcombe, who in collaboration with J. B. Whitemore, Superintendent, developed this machine, has been with the Westinghouse Lamp Division for 8 years. At first employed in experimental combustion work, he was made Factory Engineer in 1930.

In 1934 he received a cash award, similar to that just presented to him, for joint development, with H. K. Richardson, of a platinum alloy die for use in glass furnaces.

New $200,000 Bonderizing Plant

An announcement is made by the Detroit Steel Products Co., of Detroit, Michigan that a new $200,000 Detroit plant has been placed in operation in which Fenestra steel windows are treated by the Bonderizing process, and the paint baked on by a new method, vastly increasing resistance to rust, and multiplying the life of the priming coat of paint three to five times.

Bonderizing is a method of treating surfaces of metal that chemically changes that surface to make it resistant to rust. Through this process a non-metallic surface is formed, providing a rust-inhibiting base which has a greater affinity for paint, which is also baked on. This results in a two-fold achievement: all surfaces are guarded against erosion and effect a more positive adhesion for the finish coats of paint. The application of Bonderizing in this case was worked out through the collaboration of the engineers of Detroit Steel Products Co., the Parker Rustproofing Corp., Detroit, and the DuPont Corp., Wilmington, Del., in an effort to bring about the most practical result.

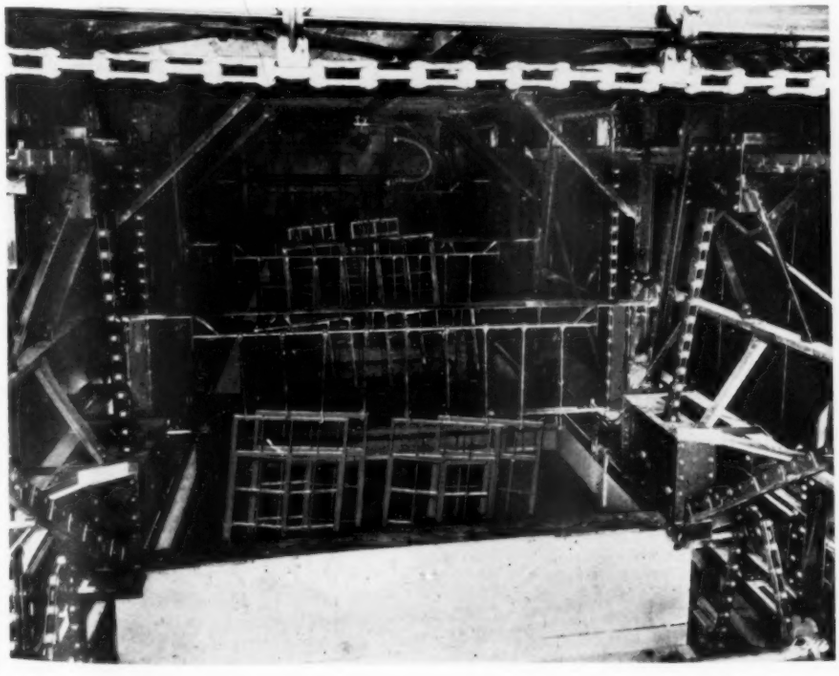
To accommodate this improvement, Detroit Steel Products Company has erected a building 40′ wide x 234′ long, two stories high with a basement and sub-basement. It is devoted exclusively to the Bonderizing process. Including the special equipment, installed, it represents a total cost of over $200,000.

Notwithstanding the fact that Bonderizing is a time-proved process and has been employed in the automotive, refrigeration and other fields for several years, its application to steel window manufacture on a production basis is said to be entirely new. It takes two hours and a quarter to complete the Bonderizing of Fenestra steel casements. During this period the steel frames travel continually on a moving chain receiving their various treatments as they pass along.

The first essential is to clean the frames of all oil, grease and foreign matter that has accumulated on the surfaces during the fabricating process. After receiving a thorough "hot shower bath" as they pass through a cleaning tunnel, the frames take four successive dips into a series of huge tanks: the first is a rinse bath, the second contains the Bonderizing solution, the third is another rinse, and the fourth is a chromic acid bath.

When cooled, the frames descend into a vat of paint, from which they enter the enormous baking oven, 74 feet long, constantly maintained at a temperature of over 300 degrees. Here they remain 45 minutes while the paint is baked on. Emerging from this oven, the steel frames are air cooled and by the time they reach the end of their trip, they can be handled comfortably by hand.

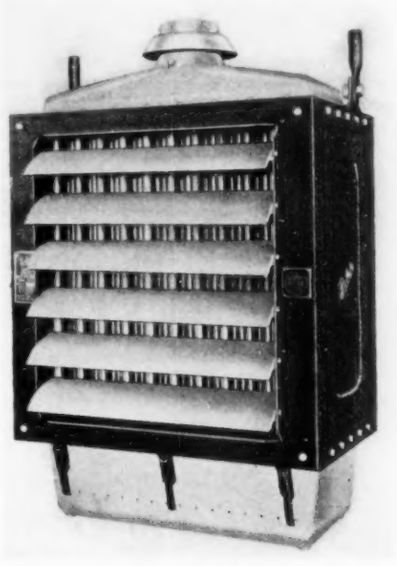
What actually happens in the Bonderizing tank is this: the normally smooth, metallic surface of the steel window is chemically converted into a non-metallic, phosphated, crystalline structure, "toothed" with millions of microscopic peaks and pits. Later, when paint is applied to this surface, it flows into the crevices between the crystals and is thus "keyed" into the steel. This process, according to the company engineers, makes Fenestra steel windows rust-resisting and makes the priming coat last three to five times longer; also that by providing a tough, durable base coat, the process imparts a property to the surface that improves the appearance and lasting qualities of all finish coats applied later and guards against creeping alkali erosion between the steel and paint filament.



Four tanks with a capacity of more than 7,000 gallons; each receives the steel windows progressively during the process of Bonderizing. The entire process is mechanized by a continuous conveyor system—human hands do not touch the windows until the paint has been baked on and has dried.

Unit Heaters

Bulletin No. 3050 issued by the Buffalo Forge Company, Buffalo, N. Y., describes in detail the line of unit heaters made by that company. One of the new types is the suspended gas unit heater for burning artificial and natural gas. Operating labor is restricted to merely pushing a button to start or stop. Several automatic safety features are included, such as:



Buffalo suspended gas unit heater

Gas shuts off when fan stops; comes on again on resumption of current.

Fan shuts off on failure of gas supply; will not start until pilot is lighted again.

Gas and fan shut off when burner pan is lowered for inspection; gas flames can't blow up in your face.

No gas or electrical connections to break when pan is lowered; even the pilot remains lighted.

High Temperature Paint

A new paint, to withstand 1000 deg. F., is a product of the Fisher Scientific Co., 711-723 Forbes St., Pittsburgh, Pa.; called "Plicote" Laboratory Paint. Plicote is available in cream, light gray, battleship gray, dust, brown, green, black, red and aluminum. The high temperature aluminum paint is the type that will stand the temperature of 1000 deg.

This material is recommended for ovens, furnaces, steam pipes, exhaust pipes, stacks, etc. The manufacturers state that it will not discolor, crack, peel or blister within the stated temperature range, that it dries rapidly and gives a smooth, brilliant silvery finish.

Valve Rammers

The Dayton Pneumatic Tool Company, Dayton, Ohio, has developed a new line of pneumatic rammers for bench, floor and backfill ramming.

Dayton Reed rammer valve unit

These rammers have a unique valve unit which, it is stated, will last indefinitely without repair or replacement, the main valve being a blade which operates with a side action in a vertical slot.

The cylinder bores on all tools are *hard chrome plated*, as well as all piston rods. These features increase the life of the rammer from two to three times. Dayton Reed valve rammers, it is claimed, have less parts than other rammers and the air consumption is less.

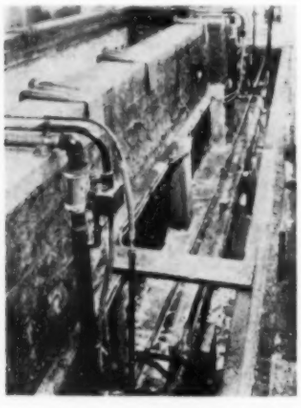
Dayton Reed No. 4 bench rammer

Specifications

Size	No. 4	No. 7	No. 77
Piston Diameter	1 1/16″	1¼″	1½″
Piston Stroke	4″	6″	6″
Weight	13½ lbs.	21 lbs.	28 lbs.
Length overall	21″	50″	51″

New Application of Submerged Gas Combustion

An improved method of heating liquids in open tanks, new to the public and known as Submerged Gas Combustion was announced at the 19th Annual Convention of the American Gas Association in Cleveland, September 28th. A description of the operating advantages and economies of this new development was given in paper before the Industrial Gas Section by C. H. Lekberg, Northern Indiana Public Service Co., Hammond, Ind.



Submerged gas combustion installation

In this new method the flame is directed through a tubular combustion chamber which conducts the hot products of combustion down to and across the tank bottom where they may be vented and distributed to give the rate and control of agitation desired. This produces a violent agitation which is of particular value in such operations as pickling. This method also opens up possibilities for the extension of gas service in other fields such as, for instance, the heating and agitation of cleaning solutions.

The production rate of a pickle tank in a steel mill can, it is stated, generally be increased 100% by the use of submerged gas combustion, but experiments in one mill indicate that 3½ times the old rate could be accomplished if the material handling equipment were adequate. Acid dilution is a considerable factor where live steam is employed but with submerged gas combustion this element is entirely eliminated and acid savings of 25 to 50% are thereby effected.

As the rate of scale removal is in almost exact proportion to the rate of agitation one feature claimed for this unit is that an exceptionally high rate of agitation can be maintained regardless of the solution temperature or rate of heat input. The new gas burner system is entirely automatic in its operation and controls pickle temperatures to meet the most exacting conditions. Individual submerged gas combustion units make of each pickle tank an independently operated unit free from a central boiler installation. This provides flexibility of operation.

Heavy Duty Air Grinder

A heavy duty air grinder has been presented by M-B Products, 130 E. Larned St., Detroit, Mich. This flexible shaft grinder has a body of streamline design; is said to have the exclusive feature of three stages of power and three ranges of speed and a simple governor which regulates the maximum speed.

Power is controlled by a series of three air jets, any one of which will operate the grinder. Furnished with each grinder is an adapter for use in the tool post of a machine, to set up an efficient internal grinder.

MB heavy duty air grinder

150 Ampere A. C. Transformer Arc Welder

A 150 ampere A. C. transformer type arc welder has been added to the line of machines manufactured by the Wilson Welder and Metals Co., Inc. of 60 East 42nd Street, New York City.

With the addition of the new model, there are now available A. C. arc welders in capacities of 150, 300, 500, 750 and 1,000 amperes. All are complete and self-contained units and need no other accessories, except the welding cable, electrode holder and hand-shield.

Recently redesigned, the entire line has an excellent appearance, and in internal arrangement and selection of materials, each is constructed especially for rough, hard shop usage. One of several distinctive features incorporated in the machines includes a system of three controls or adjustments of the welding current. Through the medium of the first two controls it is possible to obtain 25 coarse adjustments. The third control offers a further and finer adjustment of current values within any one of the foregoing twenty-five. By means of these three controls an infinite number of settings may be secured.

Wilson 150 amp. transformer and welder

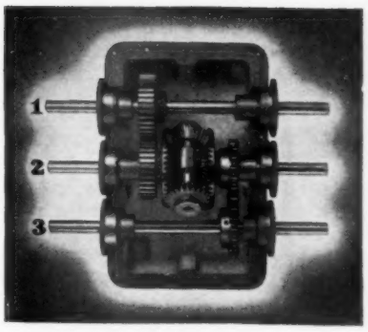
New Differential

Supplementing its line of accessory equipment for use with the Reeves Variable Speed Transmission, Reeves Pulley Co., Columbus, Ind., has developed a new differential.

Within a unit housing are mounted three parallel shafts operating in a bath of oil. Gears of 1:1 (stock) ratio drive between shaft 1 and the differential gearing. Between shaft 3 and the differential gearing is 1:1 chain drive. (Special ratios are also available.)

For automatic control service, shafts 1 and 3 are connected to the driven machine or machines. Shaft 2 is connected to the speed changing screw of the Reeves Transmission. When shafts 1 and 3 are driven in the same direction at the same speed, shaft 2 stands still. When the speed of the driven machine varies above or below desired speed, this variation is transmitted to shaft 2 which speeds up or slows down the Transmission until synchronous speed is restored.

Infinite range of speed variation is possible by connecting shafts 1 and 3 to the constant and variable speed shafts, respectively, of the Transmission. By turning the



Reeves differential

speed control hand-wheel on the Transmission, shaft 2 may be adjusted to any speed in either direction, including zero r.p.m.

Overall dimensions of the unit are 8 inches wide, 11 inches long and 6⅝ inches high.

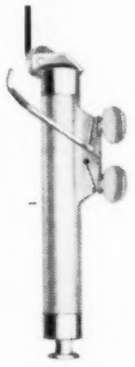
Mechanical Striping Facilities

Streamlining, with its popular appeal, has focused recent thought on striping methods and the development of refinements in mechanical striping tools. The Beugler Mfg. Co., 4318 W. 2nd St., Los Angeles, Calif., has incorporated into its product several exclusive improvements along these lines.

Striping on the curved surfaces of mouldings is said to be facilitated by an adjustable "swivel-acting" wheel head. Another outstanding feature is that of making the striping wheel and axle both of hardened steel to insure long wearing surfaces and truer action.

Elimination of dripping is said to be accomplished with an improved design whereby the natural movement of the striping wheel causes any surplus material to be automatically drawn back into the barrel and remixed, even when the striper is used in difficult positions.

An additional exclusive feature is that the wheel head is provided with an extension for striping with straightedge or templet if desired instead of with the adjustable guides.



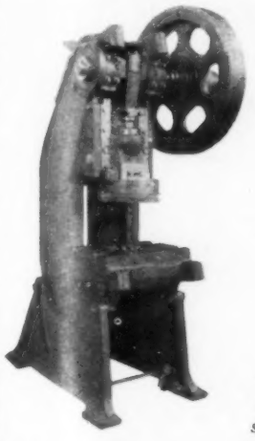
Beugler mechanical striper

The Beugler striper does not depend upon gravity or pressure. Striping material is held in contact with the wheel by a movable plunger thus permitting striping in all positions.

This tool is designed for easy cleaning, requiring only one minute for a complete change of color. It is made to operate with any standard striping material.

Compact Slide Cushion

The Marquette Tool and Mfg. Co., 1420 Hastings St., Toledo, Ohio, a division of E. W. Bliss Co., is announcing a new compact pneumatic slide cushion. This cushion is mounted under the slide, as shown in the photograph, and can be used in conjunction with Calleson blanking, drawing and curling dies to replace the springs or rubber cushions. They are also equally adaptable to stripping and blankholding operations.



Marquette pneumatic slide cushion

The functioning of this cushion as a stripper has, it is stated, a number of advantages over the spring type. No jacking-back of the stripper plate against stiff springs is necessary when setting dies. All that is required is to release the air from the cushion and the stripper plate will easily slide back out of the way. No springs are used and their possible breakage is eliminated. Furthermore, it is possible to control the stripping in a positive manner so that the cushions will operate at the correct moment.

It is possible with the use of these slide cushions and the regular cushions in the bed, to convert a single-action press into a triple-action press.

When these cushions are used with Calleson dies, the cushion and the draw ring proceed down together, blanking and drawing the shell. In the next step, the upper draw ring recedes while the lower forming die, actuated by either air cushions or the less desirable springs, pushes upward, forming the edge curl against the pressure of the slide cushion, pushing on the top of the cover. When the edge is completely curled, the slide cushion recedes with the upper draw ring while the lower forming die ejects the shell. The stroke of the slide cushion must be the length of the edge curl.

A flexible hose connects the cushion with the air supply.

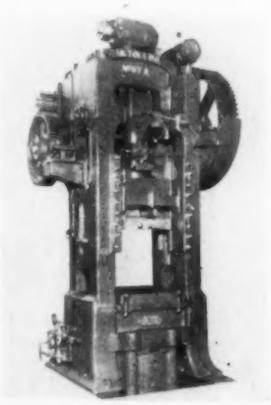
These cushions are built in all sizes.

Single and Double Action Press

The general utility purpose single action press with built-in drawing cushions to do double action work, has become increasingly popular. A new design of the "Toledo" No. 57-A press, shown herewith, brings out some interesting angles on this combination. The press is fitted with a semi-built-in heavy duty "Marquette" hydro-pneumatic die cushion. In its high range this cushion gives about double the normal blankholding pressure, adapting the unit to shape-stretching jobs requiring a very high gripping pressure around the edge of the blank. On such work it is entirely possible to use gripping pressures equal to or exceeding the drawing pressure.

The use of high blankholding pressures particularly with deep draws, involves a decided increase in capacity of the whole driving train on the press including the flywheel and motor. For equivalent work this naturally puts the single action machine and cushion in the price class of the equal double action toggle press. Here it may be interesting to note comparatively, that the single action job has advantages in suitability to single action work, and is convenient holding pressure control for double action work. On the other hand the toggle double action press has advantages in positive gripping for stretching jobs with draw beads and in power economy on deep draws.

The press shown in the photograph is manufactured by The Toledo Machine and Tool Co., Toledo, Ohio, a division of E. W. Bliss Company.



Toledo No. 57-A press

Magnesium Alloy Pattern Plates

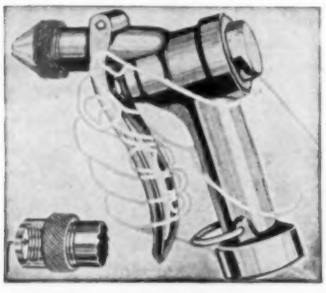
Pattern plates made of a magnesium alloy, Dowmetal, are being produced by the Freeman Supply Co., 1152 E. Broadway, Toledo, Ohio. These pattern plates, said to be superior to others because of their light weight, are uniform in thickness, with a sand-blasted, velvety finish, ready to mount.

Freeman Dowmetal pattern plate

The manufacturers state that the plates are stronger than either cold rolled or cast aluminum, that they machine better than any other metal, that it is easier to mount the pattern through the plate on them and to drill and tap. Accuracy is 0.0025" parallel tolerances.

Air Gun

The Molded Specialties Co., 4712 Chester Ave., Cleveland, Ohio, is the manufacturer of a new air gun called No. 200 Tri-Con. This gun embodies a patented design in flow-control mechanism and, it is stated, the trigger handle enables the operator to



No. 200 Tri-Con air gun

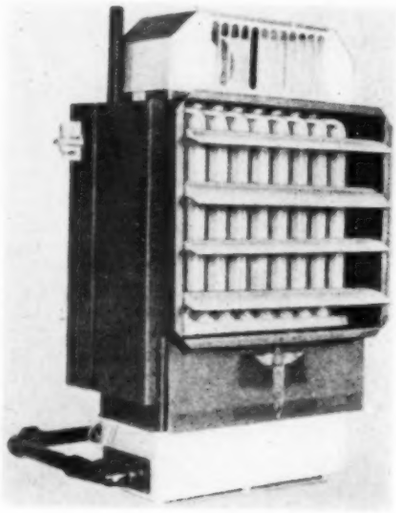
regulate the volume of the air desired as easily and as naturally as operating a pistol. The body and the trigger handle form a large hook enabling the operator to hook the gun on the machine or bench so that it is always within reach.

The gun is recommended for blowing off water beads, cleaning out gas and oil lines, foundry work, etc.

Heater to Dry Polishing Wheels

An interesting application of a gas-fired unit heater is shown by an installation of the Surface Combustion Corp., Toledo, Ohio, in the plant of the U. S. Spring & Bumper Co., Los Angeles, Calif. A gas-fired Janitrol unit heater was placed in the polishing wheel drying room where it was found that a temperature of 85 degrees F., and a relative humidity of 50 per cent gave satisfactory results. The heater, it is stated, supplies an input of 80,000 B.t.u., with thorough circulation of the air, discharging warm air into the upper section of the room over the wheels. A recirculation duct takes off across the end of the room underneath a slotted floor and returns the air to the unit heater.

The moisture is controlled by a humidistat which operates a damper in the vent stack and fresh air inlet. The fan of the heater runs continuously and the heat is cut in and out by a small solenoid in the gas-operated control system.



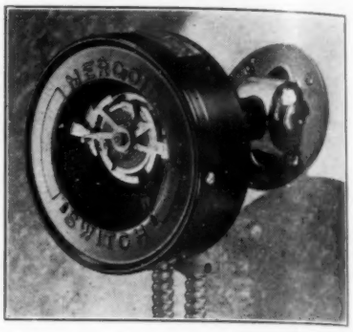
Gas fired heater for drying polishing wheels

Control for Warm Air Furnaces

A new combination control has been produced by the Mercoid Corp., 4201 Belmont Ave., Chicago, Ill., for automatically fired warm air furnaces, equipped with a fan and blower. This control in a single unit is designed to replace the two separate controls generally used. The device is called the Mercoid Combination Fan and Limit Control.

The function of a limit control is to protect the furnace from overheating. In case of abnormal conditions such as a cold draft of air on the thermostat, the limit control functions as a thermostat until the abnormal conditions surrounding the regular thermostat are corrected. The device also acts as a fan control, regulating the operation of the blower.

A number of special features are embodied including the following: temperature indicating pointers provided for two duplicate scales (one on each side of the dial) to facilitate reading of the temperature in the furnace hood or duct; simplified double adjustments by "high" and "low" levers; mercury contact switches; adjustable mounting flange.



Mercoid combination fan and limit control

Annealing Box

The Hoffman "Flexbox" is a new type of box for annealing and heat treating processes, made by the American Manganese Steel Co., Chicago Heights, Ill., (Division of the American Brake Shoe and Foundry Company). The outstanding feature of the Flexbox is its construction. The ends, sides, bottoms and covers are cast separately. The ends are made with vertical grooves into which fit corresponding tongues on the side castings. There are matched slots in both tongue and groove for holding pins to prevent relative vertical movement of the parts, but this does not hinder adequate horizontal movement.

Distortion or cracking is avoided, and corrugations in the box give greater strength under higher temperatures. If the box eventually fails, the defective section can be replaced at the fraction of a cost of the entire box.

Hoffman "Flexbox"

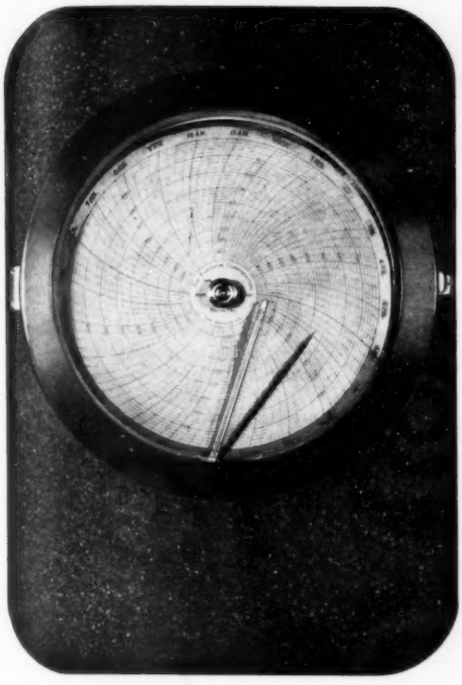
Temperature Recorders and Recording Controllers

Four new models of temperature instruments have been added to the line of the Partlow Corporation, New Hartford, N. Y. (suburb of Utica). These models are designated as AP and APF temperature recorders and AR and ARF temperature recording controllers.

The temperature recorders are moderately priced instruments for accurately recording temperatures up to 1000 deg F. They use the Partlow mercury actuated flexible element made of steel. All elements are interchangeable so that in case of accident or misuse, they can be repaired or replaced without sending the entire instrument back to the factory. The instruments use a special sensitized paper and stylus instead of ink for making permanent records. When the element is used in places that would corrode steel, a protecting sleeve or well must be provided in order to encase the bulb and tube adjacent.

Models AR and ARF are also moderately priced instruments, for accurately recording and controlling temperatures up to 1000 deg. F. They also use a special sensitized paper and stylus instead of ink, and the Partlow mercury actuated control element made of steel, with the interchangeable feature.

Bulletins 900-A and 901-A give full details of these instruments.



Partlow Model ARF temperature recording controller

Partlow Model APF temperature recorder

High Speed Solder Sweating in Convection Oven

In the operation of an oven recently installed for high speed solder sweating of radiators, the time cycle is measured in seconds. Accurate time control and exceptionally uniform conditions are essential because in order to secure the most satisfactory soldering it is necessary that the solder be melted and penetrate every one of the hundreds of joints, yet not be overheated so as to cause the solder to run out of the fillets.

The timing is controlled by means of a processing clock with a dial graduated in seconds, located at the front of the oven in full view of the operator. This clock is set to signal by means of a flashing light and a bell when the charge of radiators has been in the oven the correct length of time. The time in the oven will vary according to the size of the radiator cores, the gauge of the material and other factors. When based on a 60 second processing cycle the production is one radiator per minute.

The heating chamber in the oven is 3 ft. 9 in. wide, 5 ft. 5 in. deep and 10 in. high.

When the radiator cores are completely assembled and ready for soldering they are placed on a loading rack mounted on four wheels which run on tracks extending out of the oven to a loading and unloading bench. This loading bench is 3 ft. above the floor, a convenient height for loading.

A hood connected to a stack is located across the front opening to carry away fumes which might come out of the oven when the rack is being pulled out and while it is in the loading position.

Temperature in the oven is automatically controlled by a Brown mercury filled indicating controller which operates in conjunction with the air heater control system. This instrument is easily and quickly adjusted for the proper oven temperature and maintains the temperature within close limits.

This oven was designed and built by Despatch Oven Company, 622 Ninth St., Minneapolis, Minn.

Despatch soldering oven

Technical Publications

Copper and Its Alloys in Automobile Design, by *D. P. C. Neave*, General Manager, Copper Development Association, London, England. Institution of Automobile Engineers, 12 Hobart Pl., London S.W. 1, England.

German Copper and Brass Welding Practice. Translation of the original German edition published in 1936 by Deutches Kupfer Institut, Berlin. Copper Development Association, Thames House, Millbank, London, S.W. 1, England.

Fusible Alloys Containing Tin, by *E. J. Daniels.* Technical Publication Series B No. 5. International Tin Research and Development Council, 149 Broadway, New York.

Mechanical Properties of Some White Bearing Metals and Other Tin-Base Alloys at Various Temperatures, by *C. E. Homer* and *H. Plummer.* Technical Publication. Series A No. 57. International Tin Research and Development Council, 149 Broadway, New York.

The Tensile Properties of a Series of White-Metal Bearing Alloys at Elevated Temperatures, by *H. Greenwood.* Technical Publication Series A No. 58. International Tin Research and Development Council, 149 Broadway, New York.

The Largest Manufacturer of Enamelled Hollow Ware "Can Do It Better With Gas" in Their Pickle Room, by *C. B. Mershon*, the Manufacturers Light & Heat Co., Pittsburgh, Pa. American Gas Association, 420 Lexington Ave., New York.

Retail Survey for 1937. Covers individual analysis of more than 100 retail lines; a parallel column showing the 1935 average as compared with that of 1936; many new lines added and some broader trade groups broken down into finer classifications; volumes of surveys have been bound for seven important trade groups. Dun and Bradstreet, Inc., 290 Broadway, New York.

The Battery Industry at a Glance. Statistics on the production of storage batteries and materials consumed. Price 25 cents. National Battery Manufacturers Association, Inc., 7 E. 44th St., New York City.

Improved Production Scheduling Brings "Tremendous Savings," by *E. D. Power*, Vice-President and General Manager, Lyon Metal Products, Inc., Aurora, Ill. Executives Service Bulletin, Oct. 1937. Metropolitan Life Insurance Co., 1 Madison Ave., New York.

"Change," by *Dr. Ernest B. Benger*, E. I. duPont de Nemours & Co., Wilmington, Dela. An address delivered October 12th, 1937, before the 26th annual meeting of the American Association of Port Authorities, at the Hotel duPont, Wilmington. A discussion of the relation of the chemical industry to the American shipping industry and the need for shipping to keep abreast of the time which are constantly changed by chemical and other industrial developments.

Government Publications

Standards for Dental Materials; developed as a result of co-operative research between the National Bureau of Standards and American Dental Association: 1. Dental Amalgam Alloys; 2. Dental Inlay Casting Investment; 3. Dental Impression Compound; 4. Dental Inlay Casting Wax; 5. Dental Inlay Casting Golds; 6. Dental Mercury; 7. Dental Wrought Gold Wire Alloys; 8. Dental Zinc Phosphate Cement; Dental Silicate Cement. National Bureau of Standards, Washington, D. C.

Associations and Societies

American Electro-Platers' Society

90 Maynard St., Springfield, Mass.

For information on Branch Banquets see page 595. A complete list of all definite arrangements is given.

Copper & Brass Research Association

420 Lexington Ave., New York

With *John A. Coe*, president of the *American Brass Company*, presiding in the absence of *F. S. Chase*, president of *Chase Brass & Copper Company, Inc.*, the sixteenth annual meeting of the Copper & Brass Research Association was held October 22, 1937, at the Hotel Biltmore, New York.

The following officers were elected:

President, *F. S. Chase*, president of Chase Brass & Copper Company, Inc.

Vice president, *John A. Coe*, president of the American Brass Company.

Vice president, *C. D. Dallas*, president of Revere Copper & Brass, Inc.

Vice president, *Wylie Brown*, president of Phelps Dodge Copper Products Corporation.

Treasurer, *C. D. Dallas*, president of Revere Copper & Brass, Inc.

Secretary, *Bertram B. Caddle.*

Following are those elected to the executive committee:

J. A. Doucett, Revere Copper & Brass, Inc.; *R. L. Coe*, Chase Brass & Copper Company, Inc.; *F. E. Weaver*, The American Brass Company; *Wylie Brown*, Phelps Dodge Copper Products Corporation; *W. M. Goss*, Scovill Manufacturing Company; *H. W. Steinkraus*, Bridgeport Brass Company.

The board of directors elected includes the members of the executive committee and the following: *F. S. Chase*, Chase Brass & Copper Company, Inc.; *C. D. Dallas*, Revere Copper & Brass, Inc.; *John A. Coe*, The American Brass Company; *R. E. Day*, Bridgeport Brass Company; *E. O. Goss*, Scovill Manufacturing Company; *J. P. Lally*, C. G. Hussey & Company; *C. E. Limbocker*, Wolverine Tube Company; *H. A. Staples*, Phelps Dodge Copper Products Corporation; *F. L. Riggin*, Mueller Brass Company; and *Bertram B. Caddle*, secretary of the Copper & Brass Research Association.

Connecticut Non-Ferrous Foundrymen's Association

Headquarters, c/o Louis G. Tarantino, 670 W. Jackson Ave., Bridgeport, Conn.

A meeting of the Connecticut Non-Ferrous Foundrymen's Association was held on Tuesday, October 19th at the Hotel Duncan, New Haven, Conn. The speakers were *W. J. Kenny* of North & Judd Mfg. Co., New Britain, Conn., who discussed *"Foundry Practice for Non-Ferrous Hardware Castings,"* and *Benjamin Stewart* of Bridgeport Deoxidized Bronze Co., Bridgeport, Conn., on *"Foundry Practice for Bearing Bronze Alloys."* Both speakers were most interesting and the session was of the highest educational type, attended by an unusually large gathering.

Foundry Equipment Manufacturers

Penton Building, Cleveland, Ohio.

The Fall meeting of the Foundry Equipment Manufacturers Association was held at the Greenbrier Hotel, White Sulphur Springs, West Virginia, October 18th and 19th. Among the subjects discussed at this meeting were: wage and employment conditions in the industry; employment practices; business conditions and prospects; administrative and selling costs in relation to volume; credit interchange service.

A feature of the meeting was the presentation of pictures and a description of *"Foundries Around the World"* by *W. F. Piper* of *Beardsley & Piper Company*, Chicago, who has just returned from a world tour.

Battery Manufacturers Association

7 East 44th St., New York

The National Battery Manufacturers Association held its 13th Annual Convention at the Sherman Hotel in Chicago, Ill., October 10-12.

L. B. F. Raycroft of the Electric Storage Battery Company was re-elected President for a third term. Among the papers read at the convention were the following: *Storage Battery Paste* by *H. R. Harner*, Eagle-Picher Lead Company; *Varieties of Battery Oxides* by *Dr. J. O. Johnstone*, Metals Refining Company.

American Zinc Institute

60 E. 42nd St., New York

Galvanizers Committee to Hold Third Meeting in Cincinnati

A meeting of the Galvanizers Committee will be held November 16-18 at the Netherland-Plaza Hotel, Cincinnati. According to an announcement by *F. G. White*, chairman of the Galvanizers Committee, three technical sessions are scheduled and two plant inspection trips, to the Newport Rolling Mill Co., Newport, Ky., and the American Rolling Mill Co., Middletown, Ohio.

International Acetylene Association

30 E. 42nd St., New York City

The International Acetylene Association will hold its 38th annual convention at the Tutwiler Hotel, Birmingham, Ala., November 10-12, 1937.

Among the technical papers of interest to non-ferrous metal manufacturers which will be read at this convention are:

Joining Copper Bus-Bars with Brazing Alloys, by *R. A. Goeller*, Vice President, Hatzel and Buehler, New York.

Round Table Discussions on Aluminum, Nickel, Copper and Other Non-Ferrous Metals.

Round Table Discussions on Bronze Welding.

Exposition of Chemical Industries

Grand Central Palace, New York

The Exposition of Chemical Industries announces as the winner of its contest for a slogan for the chemical industries, *Norman E. Diehl*, assistant division purchasing agent, E. I. duPont de Nemours & Co.,

Wilmington, Dela. Mr. Diehl wins first prize of $250 for the slogan *"Chemical Research Creates Industries."*

Among the 300 exhibits of leading manufacturers will be included displays of precious metals, gold, silver and platinum showing their newest applications for both laboratory and plant. Tantalum will be the subject of an educational exhibit. Specialized applications of lead and its alloys will be shown including antomonial sheet lead and tellurium sheet lead, etc. Specialty items will include Babbitt metals, casting metals, type metals and solder; also pewter and block tin in sheets, impression lead, gasket metal and discs for making collapsible tubes.

Personals

Dr. Paul D. Merica

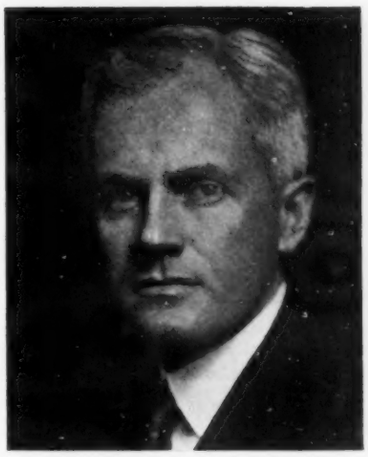
Dr. Paul Dyer Merica, director of research of the International Nickel Company and vice president of the International Nickel Company of Canada, has been awarded the 1938 John Fritz Gold Medal, highest of American engineering honors, for "important contributions to the development of alloys for industrial uses," it is announced.

The award is made annually for notable scientific or industrial achievement by a board composed of representatives of the four national engineering societies of civil, mining and metallurgical, mechanical, and electrical engineers.

Dr. Merica's extensive research in theoretical and practical metallurgy has increased scientific knowledge in both ferrous and nonferrous fields, the citation of the board points out. "He has contributed generously to the science of metals, his work having covered the magnetic mechanical properties of steel; railway materials; failure of brass; the constitution, manufacture and application of light alloy of aluminum; heat treatment of cast aluminum alloys; the precipitation theory of hardening of metals; and nickel and nickel alloys," it is declared.

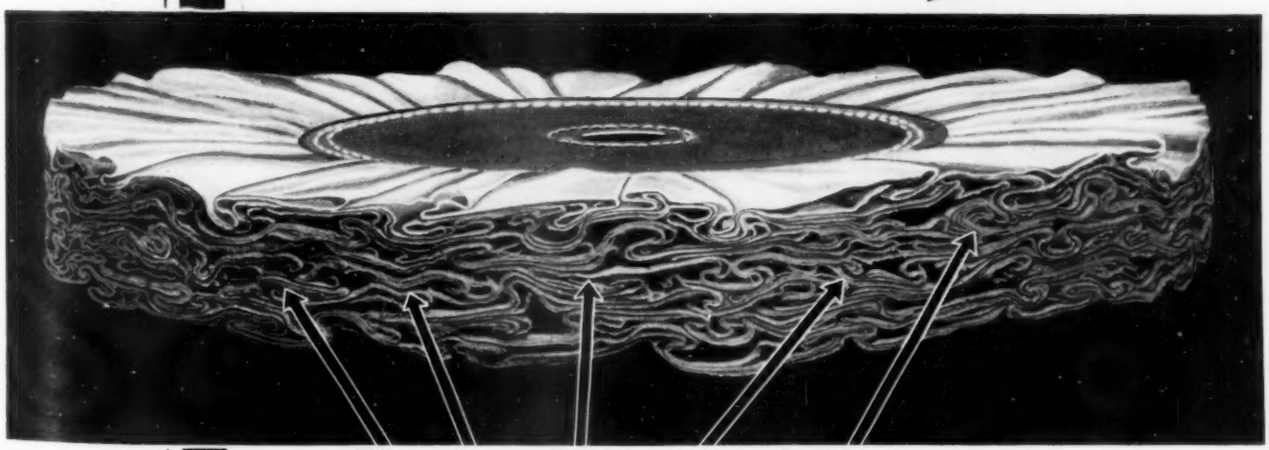
Dr. Merica was born in Warsaw, Ind., on March 17, 1889. He studied from 1904 to 1907 at De Pauw University, which in 1934 conferred upon him the degree of doctor of science. In 1909 he received the bachelor of arts degree from the University of Wisconsin, and in 1914 the Ph.D. degree from the University of Berlin. Following five years of work as research physicist in the U. S. Bureau of Standards, Dr. Merica in 1919 became director of research of the International Nickel Company. His home is at Millwood, N. Y.

He is a fellow of the American Association for the Advancement of Science, and a member of the American Chemical Society, the Electrochemical Society, the American Society for Testing Materials, the American Physical Society, the American Institute of Mining and Metallurgical Engineers, the American Institute of Civil Engineers, the Washington Academy of Sciences, the Institute of Metals, the Iron and Steel Institute, the Canadian Institute of Mining and Metallurgy, and Duetsche Gesellschaft fur Metallkunde. He belongs to Beta Theta Pi, Phi Lambda Upsilon, and Epsilon Chi. He is the author of many articles and monographs in scientific and technical publications. In 1929 he received the James Douglas Medal.



Dr. PAUL D. MERICA
John Fritz Medallist

THE BIAS BUFF



These Arrows Point to the Overlapping

These arrows point to the overlapping of the cloth. This feature gives practically double the polishing surface when compared with an ordinary buff. The polishing compound is retained in these spaces and makes the cutting force powerful and 100 percent effective.

The construction of the Overlap Ply BIAS Buff is so unique, that by use of selected grades of material it is possible to make buffs of soft and hard densities. These buffs lend themselves to a wide variety of service from coloring jobs to heavy cutting down work.

Why not try it out.

Made by The **BIAS Buff and Wheel Co.** 430 Communipaw Ave., Jersey City, N. J.

—The Overlap Ply Type BIAS Buff

Among the thirty-three previous recipients of the John Fritz Medal were Lord Kelvin, Thomas Edison, Guglielmo Marconi, Elihu Thomson, John R. Freeman, John F. Stevens, Elmer A. Sperry, Daniel C. Jackling, Michael I. Pupin, J. J. Carty, J. Waldo Smith, Frank Julian Sprague, William Frederick Durand, and Arthur N. Talbot.

H. B. Kahle

H. B. Kahle, who has been head of the Arnold, Pa., extrusion department of the Aluminum Company of America for the past three years, has been promoted to the position of superintendent of the new extrusion works now being built at Lafayette, Indiana.

A graduate of Allegheny College, Mr. Kahle was first employed by the Aluminum Company in 1917, when he was assigned to laboratory research at New Kensington. Three years later he was made technical supervisor of the Edgewater, N. J., works, and in 1922 held the same position at the New Kensington, Pa., works.

H. B. KAHLE

In 1925 Mr. Kahle was promoted to head of the extrusion department at Arnold, only to be made New Kensington sheet mill head a year later. From 1928 to 1934 he was assistant superintendent of the Niagara Falls fabricating plant, then again transferred to New Kensington, to discharge the duties he had prior to his present Lafayette position.

Witold W. Kosicki

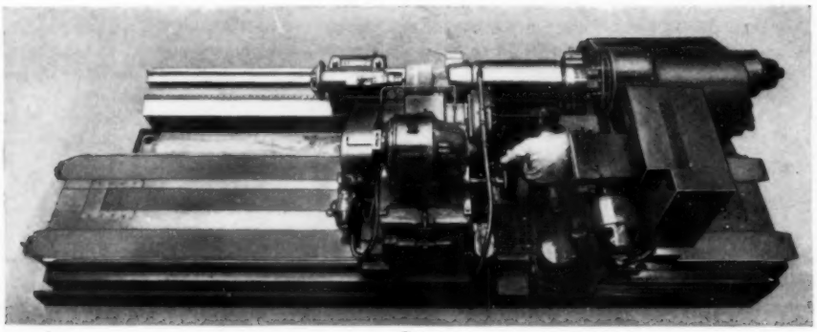
Witold W. Kosicki who has been for seventeen years in charge of the metallurgical department of J. T. Wing & Company, has started a business of his own under the name of Metalloy Products Co., 140 W. Atwater St., Detroit, Mich.

Mr. Kosicki was born in 1884 in the village of Kumary, Poland. He entered Polytechnic Institute in Kieve in 1905 and in 1912 received degree of Mechanical Engineer. He then entered the Mining Institute of Petrograd. He was preparing to join the staff of the Mining Institute but the World War prevented his plan from succeeding.

During the War Mr. Kosicki was Munition Inspector of the Russian Artillery Commission and in 1916 was sent in the same capacity to the United States. In 1918 he resigned and entered Massachusetts Institute of Technology and in 1920 obtained his Master of Science degree. He was in the Testing Department of the Anaconda Copper Mining Company in 1918 and in 1920 joined J. T. Wing & Company as metallurgist in charge of the White Metal Bearings Department. Afterward he took over the work of smelting and refining and a brass, bronze and aluminum foundry.

Mr. Kosicki is also interested in Mechanics Association, Inc., a Polish-American corporation possessing two large plants and mines in Poland. His private interests include organization of the Polish Engineering Society, membership in American Foundrymen's Association, Engineering Society of Detroit and the Technical Society of Warsaw, Poland. His hobby is art and music.

WITOLD W. KOSICKI



ROLL FINISH *and* CONTOUR

The Farrel crowning and concaving attachment produces a mathematically accurate curve of correct shape for either a crowned or concaved roll, exactly symmetrical on both halves of the roll. The same setting invariably produces exactly the same curvature and permits fixed, uniform and easily controlled accuracy of contour in all rolls.

The finish of roll surfaces and the accuracy of crown shape are important factors in the rolling of sheet and strip with the quality of surface smoothness and the uniformity of gauge demanded by modern requirements.

Many rolling mill operators insure the quality of their output by grinding their rolls or having them ground in Farrel Roll Grinders. These machines are designed to grind rolls of any material to any desired finish which can be obtained with wheels at present available, with a perfect surface free from marks of any kind and with straight, concave or convex contours ground to exact symmetry and accuracy.

In addition to substantial savings in roll finishing costs and in longer roll life, the control of roll accuracy and finish permits control of the quality of flat rolled products, assures uniformity of gauge and diminishes the quantity of sub-standard product.

Our Bulletin No. 111 describes in detail the various features of design and construction which are responsible for the superior performance of Farrel Heavy Duty Roll Grinders. Copies will be sent free on request without obligation.

FARREL

FARREL-BIRMINGHAM COMPANY, Inc.
ANSONIA, CONN.
New York • Buffalo • Pittsburgh • Akron • Chicago • Los Angeles

Dr. Frank J. Tone, Carborundum Company, Niagara Falls, N. Y., has been selected to receive the Perkin Medal of the Society of Chemical Industry for 1938. This medal is awarded annually for valuable work in applied chemistry and will be given to Dr. Tone this year for the development of abrasives and refractories. The medal will be presented January 7th, at a meeting to be held at the Chemists Club, New York.

Dr. Foster Dee Snell, 305 Washington St., Brooklyn, N. Y., addressed the St. Louis Section and Kansas City Section of the American Chemical Society on October 4th and 5th respectively, on the subject of "*Some Factors in Detergency.*"

Esmond W. Gifford is now employed with Foster D. Snell, Inc.

Elmer F. Weiss has been appointed Manager of the Detroit office of Cutler-Hammer, Inc., Milwaukee, Wisc. Mr. Weiss will be located at 2755 E. Grand Blvd.

A. R. Johnson, formerly manager of the Detroit office of Cutler-Hammer, Inc., Milwaukee, Wis., has been appointed manager of the company's Merchandising Sales Division.

E. T. Rees has been appointed manager of the Indianapolis, Ind. office of Cutler-Hammer, Inc. He will be located at 307 N. Pennsylvania Avenue.

F. J. Woldrich has been appointed manager of the new Portland, Oregon office of Cutler-Hammer, Inc., with headquarters at 625 N. W. Everett Street.

F. M. Maichle has been appointed manager of the Detroit office of the Lincoln Electric Company, Cleveland, Ohio. He will be located at 10228 Woodward Avenue, assisted by *C. H. Buckmaster, J. F. Cunningham, N. B. Gilliland, T. A. Steel* and *F. E. Boucher.*

Frederick D. Benz, formerly manager of wire sales, Chicago Branch, United States Rubber Products, Inc., 1790 Broadway, New York, has been appointed district manager of wire sales, Pacific Div., of the same company with headquarters at San Francisco, Calif.

Glen H. Treslar has been appointed assistant sales manager of Black & Decker Mfg. Co., Towson, Md. Mr. Treslar has been connected with the company for over fifteen years. *C. F. Cate*, has been appointed agent for the Southwestern portion of Texas and the Southern portion of New Mexico. Mr. Cate will make his headquarters at 234 N. Davis St., El Paso, Texas.

Norman C. Branch is now supervisor of production materials, New Departure Div., General Motors Corp., Bristol, Conn.

Harry W. Dietert of Harry W. Dietert Co., Detroit, Mich., is on a European trip covering England, France, Germany, Denmark, Sweden and Norway.

F. S. Spear, has been appointed to an executive position in the Young Radiator Company, Racine, Wisc. He was formerly with Stewart-Warner Corp., Chicago, Ill. Mr. Spear will supervise production of Young products being supplied to the automotive tractor, air conditioning and heating industries. Departments operated: tool room, soldering, brazing, tinning and lacquering.

William Gertz, instructor in the protective coatings division of the metallurgy department at the Michigan College of Mining and Technology, Houghton, Mich., was recently promoted to an assistant professorship. Prof. Gertz organized the division upon his appointment to the Michigan Tech staff five years ago immediately following his graduation from that college.

K. L. Hansen, of the Harnischfeger Corp., Milwaukee, Wis., addressed the Baltimore section of the A.I.E.E. on Wednesday, October 20, in the Maryland Hall located on the campus of John Hopkin's University. Speaking on "*The Electric Arc as a Welding Tool*," Mr. Hansen discussed the characteristics of welding generators required to meet the exacting conditions of the welding circuit, the effect of current fluctuations in the arc circuit, the effect of shielding the arc for typical arc welding application, and will illustrate a number of points by the use of lantern slides. This was also the subject of *Mr. Hansen's* talk at the Hotel Raleigh on Thursday evening, October 21, in Washington, before the Washington section of the American Institute of Electrical Engineers.

Arthur T. Cox, Jr., has been appointed manager of the Tri-Cities welding sales-engineering office, of the Lincoln Electric Co., Cleveland, O., located at Moline, Illinois, effective November 1. Mr. Cox formerly worked in the company's Chicago office. The Tri-Cities office is located at 1205-09 Fourth Avenue.

SEND TODAY FOR THE FULL DETAILS

A NEW

Money Saving Method for

Removing grease, oil and drawing compound from metal parts—cutting down "Rejects"

A large manufacturer was experiencing as high as 10% rejects, removing grease, oil and heavy duty pigmented drawing compound from various steel parts, prior to applying the final finish.

The metal parts are now cleaned with MAGNUS No. 78 (a new product), then simply rinsed, dried and sprayed. After removing parts from ovens, a thorough examination fails to locate any bubbles, poor adhesion, or white haze showing through. These bad factors were the cause of rejects when using a lacquer solvent in the previous method.

Metal working manufacturers everywhere are asking for the details of this new Magnus product that does such an excellent metal cleaning job. Without obligation, we'll gladly send you a drum of MAGNUS No. 78 on trial. Our money-back 30 day guarantee fully covers you. Or write today for more details.

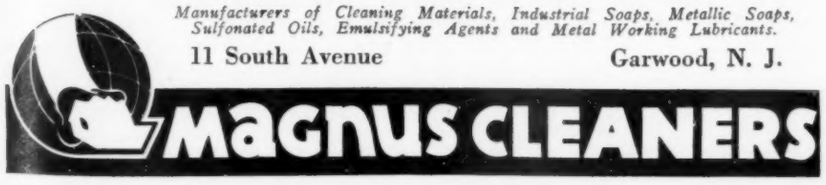
Ask the Magnus Man!

If you've a problem connected with cleaning or allied process operations—put it up to the MAGNUS MAN. He'll gladly advise the proper material and method to best handle it.
He'll show you MAGNUS MATERIALS made especially for jobs not ordinarily met by washing agents compounded for general use. He'll show you special soaps for metal burnishing—for wire drawing—for heat drawing of metal—cleaners for all types of metal pre-cleaning—and for countless other jobs.

MAGNUS CHEMICAL COMPANY

Manufacturers of Cleaning Materials, Industrial Soaps, Metallic Soaps, Sulfonated Oils, Emulsifying Agents and Metal Working Lubricants.

11 South Avenue Garwood, N. J.



E. J. Crane, editor of Chemical Abstracts, was presented with the Chemical Industry Medal for 1937, at a joint meeting of the American Section of the Society of Chemical Industry and the American Chemical Society held at the Chemists' Club, New York. This medal is awarded annually for valuable application of chemical research to industry. *Mr. Crane* spoke on the subject "Words and Sentences in Science and Industry."

Frank B. Jewett, vice-president, *American Telephone and Telegraph Co.*, and president, *Bell Telephone Laboratories*, 463 West St., N. Y. City, will be the guest speaker at the Annual Meeting of the American Standards Association, to be held at the Astor Hotel on Wednesday, December 1, 1937. This meeting will be preceded by a lunch at 1 o'clock. *Dr. Jewett* is an internationally known scientist who has for many years had a keen and helpful interest in standardization in his own industry.

W. C. Reid, formerly Midwestern manager of the *Metallizing Engineering Co. Inc.*, with offices in Chicago, has been appointed vice-president in charge of sales with headquarters in New York. *Walter B. Meyer*, who has been manager of the St. Louis office has been moved to Chicago in the same capacity, and *Alan B. Geuder* heretofore a salesman in the Chicago office, has been made manager of the St. Louis office. The firm operates a metal spraying department.

Obituaries

Sam W. Hoke

Sam W. Hoke, manager of the Jewelers Technical Advice Co., and founder of Hoke Incorporated, died September 27, 1937, at the age of seventy-nine. Mr. Hoke was an outstanding figure in the jewelry world, and

SAM W. HOKE

it has truly been said that without the Hoke oxy-gas torches, the use of platinum as a jewelry metal might never have come about.

Samuel Woodford Hoke was born April 23, 1858, near Louisville, Ky., where he spent his youth. He had little formal schooling, but when quite young entered the publishing business, first as a printer's "devil," later as a compositor and proofreader, and in these tasks he acquired a background of general culture.

In 1886 he married Utopia Wright, a school teacher, and they moved to Chicago where Mr. Hoke entered the advertising field. In 1894 they moved to New York, with their small daughter Calm Morrison Hoke (later to become identified with the precious metal industry), where Mr. Hoke specialized in outdoor advertising. The trade name "Sam W. Hoke" became famous throughout the country in connection with billboard advertising, and Mr. Hoke helped to design and build the first electric light signs of this day, especially those with moving light effects.

In time he became interested in platinum, then a little-known metal, and in 1912 he became manager of the Jewelers Technical Advice Company of New York City. The new metal had a melting point much higher than that of gold or silver, and old processes were not adequate; the need for oxygen flames was apparent. To fill this need Mr. Hoke designed and patented a series of torches, the best known of which are the small Hoke-Jewel oxy-gas torch for soldering, and the large Hoke-Phoenix torch for melting platinum in quantities.

These torches were a conspicuous advance over old designs, not only in safety but also in economy. They permitted the use of ordinary illuminating gas at ordinary house pressure (instead of gas in tanks, as had previously been required) in conjunction with oxygen gas. This meant that the oxygen flame was available to almost any locality, at a cost within the means of even the most modest jewelry shop.

It was soon learned that the small hot flame of the Hoke torch was also suitable

As new developments in the production and finishing of metal parts bring to light new problems in cleaning, improved alkaline cleaning agents take the place of alkalies in crude form. Combining various kinds of cleaning energy into a uniformly dependable metal cleaner requires skill in balancing. The effectiveness of balance is quickly shown by the work of the Wyandotte group of balanced metal cleaners. Solutions are stable. Cleaning is thorough and rapid. Cleaning costs are low.

A manufacturer who needs larger and better production in the metal finishing department without radical change of equipment, may find a Wyandotte product to be the way to accomplish his purpose.

•

May we co-operate with you, too?

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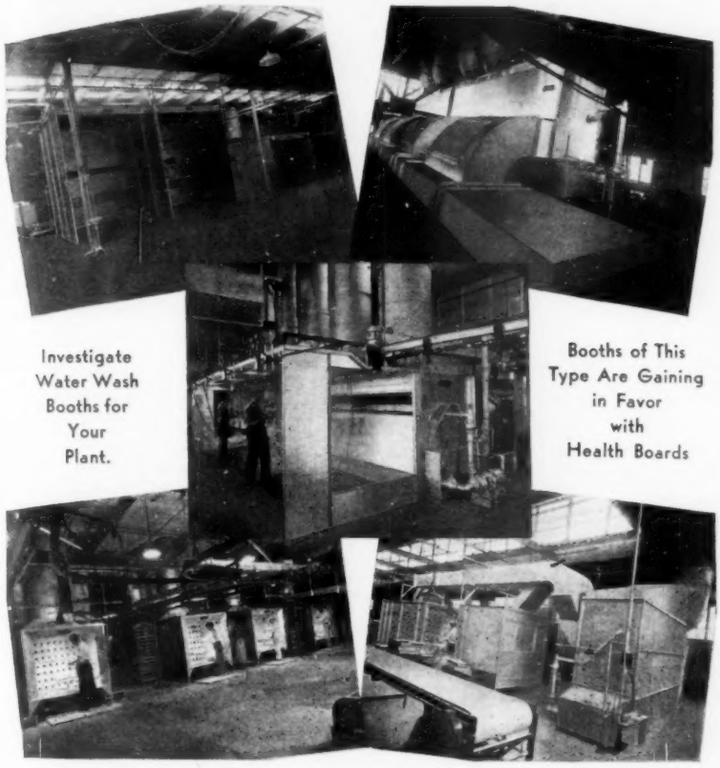
THE J·B·FORD COMPANY
WYANDOTTE MICHIGAN

OUTSTANDING BINKS WATER WASH SPRAY BOOTH INSTALLATIONS

Below are illustrated a few of the many Binks Water Wash Booths installations which are cleansing exhaust air for their users by the air wash method.



Investigate Water Wash Booths for Your Plant.

Booths of This Type Are Gaining in Favor with Health Boards

Our Engineers Will Gladly Quote After a Survey of Your Plant Needs. Write Today!

BINKS MANUFACTURING COMPANY

3114-40 CARROLL AVENUE CHICAGO, ILLINOIS

for use on gold and other metals, as well as platinum, and torches for lead burning, glass blowing, etc., were developed.

Meanwhile his daughter was acquiring a scientific schooling, and after a short experience in the teaching of chemistry she joined the Jewelers Technical Advice Co. as consulting chemist. She worked for about a year as an apprentice in a large jewelry factory, and in other ways built up a knowledge of precious metal technology. With her help the Hoke methods of refining precious metal wastes were worked up, and their sale eventually reached all parts of the world. The use of palladium as an alloy in white gold is one of their contributions to the jewelry industry.

In 1925 Hoke Incorporated was formed, to handle the regulators, valves, gauges, etc. that had been developed in connection with the use of compressed oxygen and other gases. Miss Hoke's technical training was valuable in selling these devices to scientific workers. Mr. Hoke's wife, Utopia Wright Hoke, was a woman of unusual business ability, and her help in the two organizations was invaluable. Her death in 1926 was a loss to the jewelry world.

During the depression, with jewelry-making at a minimum, Hoke Incorporated devoted itself to the new industry of compressed gases, and helped make these products available to the scientific and industrial world. A line of valves, controls, gauges, flow-meters, and the like, was worked up, useful in dentistry, medicine, glass-blowing, lead-burning and other fields. Special thought was given to oxygen therapy as applied to cases of pneumonia, and the Hoke Flo-gage and other devices for use in the administration of oxygen have attained wide usefulness.

In 1934 Mr. Hoke and his daughter sold their interest in Hoke Inc. to A. I. M. Winetraub, a civil engineer and business man, who has since carried on the line of instruments and devices at 122 Fifth Ave., New York, employing several of the workers who had been with Mr. Hoke. Since then Mr. Hoke and Miss Hoke have carried on the Jewelers Technical Advice Co., selling advice of the kind indicated by the name. Miss Hoke's book Testing Precious Metals has had a wide sale; it is expected that she will continue in business as before.

In July of this year Mr. Hoke was taken with a serious heart ailment, and passed away peacefully at his home in Palisade, New Jersey, on September 27.

C. L. Hippensteel

C. L. Hippensteel, a member of the technical staff of Bell Telephone Laboratories, 463 West St., New York, died at the Mountainside Hospital, Montclair, New Jersey, on September 30 after an illness of several months. Born in Roann, Indiana, on July 24, 1897, he attended Purdue University from which he graduated in 1921 with the degree of Bachelor of Science in Chemical Engineering. He immediately joined the chemical group of the Engineering Department of the Western Electric Company, this Department becoming Bell Telephone Laboratories in 1925.

Mr. Hippensteel's first work was concerned with the mechanical testing of rubber insulation. Shortly thereafter he became interested in corrosion and electroplating and during the past ten years had been considered an authority in these fields. Specific projects included corrosion studies of lead cable sheathing; corrosion of the hardware used in the outside plant of the telephone industry; investigation of protective metal coatings applied by electroplating; and the development of exhaustive tests to study corrosion under atmospheric, underground and laboratory conditions. He had published a number of technical papers on various phases of his research among which are: *New Mechanical Test for Rubber Insulation; Some Observations on the Atmospheric Corrosion of Protective Zinc Coatings; Outdoor Atmospheric Corrosion of Zinc and Cadmium Electro-Deposited Coatings on Iron and Steel.*

Mr. Hippensteel was a member of the American Chemical Society, the Electrochemical Society and the American Society for Testing Materials. In the latter he was a prominent member of the following committees: Corrosion of Iron and Steel; Iron-Chromium; Iron-Chromium-Nickel and Re-

C. L. HIPPENSTEEL

lated Alloys; Corrosion of Non-Ferrous Metals and Alloys; Die-Cast Metals and Alloys. He was also a member of Delta Upsilon, Tau Beta Pi and Phi Lambda Upsilon.

He was survived by his wife, Mrs. Edith Neihardt Hippensteel, his parents, Mr. and Mrs. U. G. Hippensteel (U. G. Hippensteel and Mrs. Ida L. Hippensteel), and a brother, Paul H. Hippensteel.

Frank P. Noera

Funeral services were held October 20 in New Haven for the late Frank P. Noera, 88, former owner, president and treasurer of the Noera Manufacturing Co., New Haven. Mr. Noera died at his New Haven residence following a week's illness. He retired as president of the Noera company in Nov. 23, 1923 when that concern became part of the Chase Brass & Copper Co. Mr. Noera was a native of Palermo, Italy. He emigrated to America at the age of 20 and started his business career in Boston, Mass. He was widely known in manufacturing circles as the inventor of the spring bottom oil can. He started the manufacturing of cans in the old Matthew & Willard building, a subsidiary of the Scovill Mfg. Co., and became a leader in that particular field of production.

He is survived by his wife, Mrs. Nellie (Weber) Noera, four daughters, Mrs. H. Chase of Elizabeth, N. J., Miss F. Hall of Hot Springs, Va., Mrs. L. Pole of Hot Springs, Va., and Mrs. W. Milliken of Wellesley Hills. His first wife was Ella (Hall) Noera of Cambridge, Mass.

J. Sterling Place

J. Sterling Place, Vice-President of the Hudson Smelting & Refining Company and the Industrial Metal Co. Inc., 85 Hyatt Ave., Newark, N. J., died October 9th. Mr. Place resided at 57 Hawthorne Avenue, East Orange, N. J. His death was caused by an automobile which struck him while he was crossing a street.

Mr. Place was a graduate of the Colorado School of Mines and spent his whole professional life in mining and smelting operations, including work in South America.

David Lewis

David Lewis, 58 years old, vice president of the Bartley Crucibles & Refractories Co., Trenton, N. J. and for 35 years engaged in the scrap metal business, died September 24 following a lengthy illness. He was born in Russia and moved to Trenton 40 years ago. He was long active in politics and was a member of the Trenton Lodge of Elks. He is survived by his wife and four sons. Burial was in Philadelphia.—C. A. L.

George F. Berkander

George F. Berkander, manufacturing jeweler, hospital director, bank trustee and prominent member of the Masonic fraternity, was found dead in bed at his summer home in Buttonwoods, on Narragansett Bay on October 3. He was widely known throughout the country in the jewelry industry. He was born in Sweden 58 years ago but came to this country when but nine years of age.

—W. H. M.

James R. Huntington

James R. Huntington, assistant treasurer of the Congdon-Carpenter Company for 53 years, died September 24 at the age of 72 years. He was born in Providence, on August 30, 1864 and educated in the public schools. Upon graduation from grammar school he entered the employ of the firm with which he was so long associated. His wife died several years ago. One son and two grand children survive him.

—W. H. M.

Wilbur L. Francis

Wilbur L. Francis, general manager of the Detroit Brass & Malleable Works, at Wyandotte, a Detroit suburb, died, Thursday, Sept. 23, at his home, 475 Ford Avenue, Wyandotte. The funeral was held on the following Saturday, with burial in Oakview cemetery. He was born, July 2, 1891, in Port Huron, Mich. He leaves his widow, seven children and a sister.—F. J. H.

Truman Squires Lewis

Truman Squires Lewis, 71, son of the late E. C. Lewis who founded the Waterbury Farrel Foundry, died at his home in Waterbury, Sept. 25. In his youth he was connected with that concern but retired many years ago. He was a director in several local industries and banks and a leading philanthropist. His only survivor is his widow. Burial was in Waterbury.

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EMERY CLOTH

The continued maintenance of supreme quality, durability and satisfaction to the user enhances the world-wide reputation of the name of Oakey, enjoyed for more than 100 years.

WELLINGTON MILLS EMERY
AND
ENGINEERS' EMERY CLOTH

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Cut Your Hour Costs!
POLISH and BUFF
Automatically

This Packer will lower Hour Costs and Increase Production —it's one of three styles of Machines used to efficiently and economically Polish and Buff.

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Rotary Machine

SEND for CATALOG—you'll be amazed at the many shapes, sizes and types of products being finished on Packer Machines. Write Dept. "E" today.

Rotary—Straight Line Conveyor—Portable Vertical

PACKER
Automatic
POLISHING & BUFFING MACHINES
THE PACKER MACHINE CO. MERIDEN, CONN.

Andrew W. Bell

Andrew W. Bell, Bell Brothers, Pittsburgh, Pa., died October 8, 1937.

News From Field Correspondents

Waterbury, Connecticut

October 22, 1937.

Officials of the three largest concerns say industrial conditions here have declined to the lowest level since 1932. Decrease in orders has resulted in shortened time and some minor lay-offs. Officials who confirmed this were *John H. Goss,* vice president of the *Scoville Mfg. Co., Clifford F. Hollister,* vice president of the *American Brass Co.,* and *Rodney Chase,* assistant secretary of the *Chase Brass & Copper Co.*

Plume & Atwood Mfg. Co. is offering to its stockholders, 4,000 additional shares of common stock at the price of $25 per share, at the rate of one share of stock for each 12½ shares held. The directors also announce that when the stock is subscribed for they will declare a special dividend which will exceed the amount the individual stockholder will have to pay for the stock allotted to him.

The *Waterbury Brass Workers Union,* a CIO affiliate has asked the NLRB to conduct an election at the *American Brass Co.* to determine whether or not the union shall be accepted as the bargaining agent for the employees. Officials of the union assert that the company, while earlier agreeing to an election, is now trying to "stall off" an election. Company and union differ as to whether the election should include all the plants or only the North and South plants. There is also an independent union at the plant, formed by the employees themselves.

A hearing was held here by the NLRB last month to determine whether the *Waterbury Brass Workers Union* or the *Machinists Union,* A. F. of L., should represent the workers in various of the machine departments of the *Waterbury Clock Co.* and *Chase Brass & Copper Co.* No decision was announced.

The *Atlas Tack Corp.* of Fairhaven, Mass., has leased a section of the *Beardsley & Wolcott Co.* plant and has purchased the upholstery nail division of that firm. It will operate under the name of *Berbecker & Rowland,* which was the name of the concern formerly manufacturing these nails and which was taken over some years ago by Beardsley & Wolcott.

The sale of the factory building on Cherry Avenue which has been occupied by the *Benrus Mfg. Co.* for several years to that company, has been completed after several months delay over question of title. It was formerly owned by the *Waterbury Clock Co.* and has lately been owned by the *Industrial Properties, Inc.*

The wooden factory of the *Waterbury Buckle Co.,* said to be the original home of the oldest buckle manufacturing company in the country, has been torn down. The company recently completed a new brick and steel building to take its place.

—W. R. B.

Connecticut Notes

October 22, 1937.

HARTFORD—Car loadings in this city in September amounted to 83,180 tons compared with 72,421 tons in September last year.

NEW BRITAIN—The *Stanley Works* have reduced their work week from five days, eight hours, to four days, nine hours, due to a slowing up of business.

TERRYVILLE—About 150 of the 900 employees of the *Eagle Lock Co.* have been laid off during the last month. The officials state that it hired on about 100 additional employees between last fall and June. They state there has been a downward trend in orders since June. Two months ago a new management took charge following a change in directors.—W. R. B.

Providence, R. I.

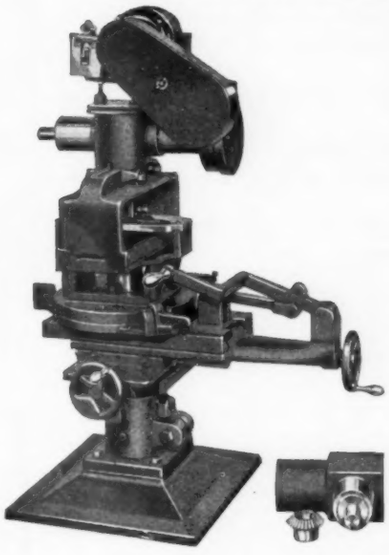
October 22, 1937.

In the 1937 tax levy in the city of Providence, made public a few days ago, among the individuals, firms and corporations that are assessed upon a valuation of $50,000 or more are 52 affiliated with the metal trades. The total assessed valuation of these aggregate $24,722,790.

The final report of *Lester W. Noyes* as receiver for *The Dovercraft Company Inc.,* of Providence was allowed by Judge Charles A. Walsh in Superior Court for Providence Council on October 18 and a decree was entered dissolving the corporation upon the

ACME AUTOMATIC
POLISHING AND
BUFFING MACHINE
TYPE "E-10"

SEE ACME FOR PRACTICAL POLISHING AND BUFFING MACHINE ARRANGEMENTS



SPECIAL MACHINERY
AUTOMATIC BUFFING MACHINES

A Stroke Machine used in conjunction with the standard lathe for polishing and buffing steam pressure cookers, utensils, covers, large reflectors, long lamp bodies and many other articles that require a stroking action to produce a finish.

For efficient production one operator runs two machines, one set at each end of the lathe. While one machine is revolving and stroking the work in contact with the wheel, the operator is unloading and loading the other machine. Production in this manner is increased several hundred per cent.

The spring tension is used principally in the polishing operation and allows the work to float on the wheel. When the spring tension is not being used, both the swivel and toggle lever are available for loading.

The cam is used where a dwell or hesitation is required in the stroking movement, allowing the work to dwell on the wheel for a number of revolutions before completing the cycle of the stroke. This arrangement is very useful for finishing the inside of trays and skillets as it allows the wheel to fully contact the sides as well as the bottom.

Net weight approximately 650 lbs.
Floor space 24" x 44"

ACME MANUFACTURING COMPANY
DETROIT MICHIGAN
BUILDERS OF AUTOMATIC POLISHING AND BUFFING MACHINES FOR OVER 35 YEARS

TINT-METAL BRIGHT METALS IN COLOR

A "MUST SEE" FOR PRODUCTION MEN

HERE, for the first time, are really *satisfactory* and *workable* colored metals. An entirely *new principle* is used to give them brightness and warmth, the like of which you have never seen. Responsible manufacturers are invited to write for *free samples* and complete information.

BEAUTIFULLY ILLUSTRATED IN FULL COLOR in our new booklet, "*Pre-finished American Bonded Metals.*" Also shows the many ways Tint-Metal and other American *Bonded* Metals add beauty, cut costs. Contains valuable engineering data and design ideas. Write for free copy—without obligation.

AMERICAN NICKELOID COMPANY
8 SECOND STREET, PERU, ILLINOIS
Sales Offices in All Principal Cities

Etching Cel-u-lak

• The etched metal industries have their own unique and specific requirements for finishing materials. We have studied them and supplied successfully formulations ideally adapted to the purpose. ¶ ETCHING CEL-U-LAK covers a wide variety of colored finishes on a composite cellulose-synthetic resin base with the following characteristics:

1. **Great adhesion to steel, brass, zinc, etc.**
2. **Marked flexibility toward usual forming and blanking.**
3. **Clean and rapid removability from resist with usual resist solvents. Solvent leaves background of Cel-U-lak unaffected.**
4. **Usual hardness for above qualities.**

In conjunction with these colored finishes we offer a clear, pale silver lacquer of remarkable stability and adhesion.

THE VARNISH PRODUCTS CO.
CLEVELAND, OHIO

CLEPO CLEANING COMPOUNDS

CLEPO *Not just a cleaning compound but a*

Scientific Cleaner Service . . .

Metal Cleaning is a simple matter when everything is right. But everything is right only when the cleaning operation begins where the cleaning compound is made, and ends in your plant through the medium of unremitting service by the maker of the compound. **CLEPO** cleaning compounds are sold on that basis.
CLEPO service does not consist simply of leaving you with a quantity of chemical. It includes a definite effort to aid you in fitting the right cleaner to each job in your plant. We believe this method is the only means by which you can reduce rejects to the barest minimum and eliminate blistered or peeled deposits, or other defects caused by improper cleaning.
CLEPO cleaners do this because they are scientifically compounded of high purity chemicals; always uniform; always supported by **CLEPO** service.

FREDERIC GUMM CHEMICAL CO., INC.
538-542 FOREST STREET KEARNY, NEW JERSEY
TECHNICAL ADVISORS and SALES REPRESENTATIVES
OLIVER J. SIZELOVE, General Technical Advisor and Sales Representati
WILLIAM VOSS — JACOB HAY — GEORGE GEHLING
METROPOLITAN — WESTERN — PHILADELPHIA

petition of *Archer L. Kent*, an officer of the corporation.

The *Rhode Island Smelting Works* are removing their plant from Roosevelt Avenue, Central Falls, to larger and more commodious quarters at 55 Pawtucket Avenue, East Providence. *J. Linwood Culbert*, president, states that in addition to larger quarters, a railroad siding will be another advantage at the new plant. He expects the removal will be effective early in November.

After listening to testimony in the suit of *M. Swift & Company, Inc.*, a Connecticut corporation of Hartford against the *W. H. Coe Manufacturing Company* of Providence, in the United States District Court here, *Judge John C. Mahoney* has reserved decision. The suit, which has been pending several months, results from alleged infringement by the *Coe Company* of patents on the manufacture of gold leaf used for stamping book covers and other objects. The witness for the defense told of the manufacture of strip gold leaf according to a process which they said was invented by the late W. H. Coe of Providence. More than thirty exhibits were introduced, ranging from small rolls of gold leaf to presses and books on the use of gold leaf in book cover manufacture.

—W. H. M.

Newark, N. J.

October 22, 1937.

Arthur A. Crafts Co., Inc., of Boston, has leased a portion of a plant here for the manufacture of lens drills, engraving points and other jewelry machines. The company has offices in many of the large cities. *Sinnok & Sherrill*, manufacturing jewelers, have leased a plant on Halsey Street. *Radio Corporation of America* will erect an addition to its plant at Harrison for a radiotron factory.

Following Newark concerns have been incorporated: *Advance Products, Inc.*, electrical devices, 2,500 shares, no par; *Powerthrons, Inc.*, vacuum tubes, 2,500 shares, no par; *Capitol Lighting Fixtures*, 500 shares, no par; *Metal Alloy Products Co.*, $15,000.

—C. A. L.

Trenton, N. J.

October 22, 1937.

The *Crescent Insulated Wire & Cable Co.*, Trenton, is erecting an addition to its plant in East Trenton. The structure will cost $32,000. The plant of the *Trenite Corporation*, Trenton, was damaged by flames on Oct. 11. The fire started in the foundry and damaged both ends of the building.

Following concerns have been chartered here: *Harbor Watchcase Co.*, Jersey City, 500 shares, no par; *Broker Chemical Co.*, Morganville, $250,000; *Acme Metal Novelty Corp.*, West New York, 2,500 shares, no par.

—C. A. L.

Detroit, Mich

October 22, 1937.

Industrial operations in this area are moving steadily ahead in spite of the stock market, the conflict in China and in Spain. In some instances the motor car companies are a little slow in reaching peak

production, but they are on their way nevertheless, and from all that can be seen and heard, the brass, copper, aluminum and accessory plants will have all they can attend to and more too, throughout the fall and coming winter.

Some anxiety is expressed concerning labor, and how far the CIO will go in its attempt to gain control of everything in this middle western area. A desperate attempt is underway just now to elect a CIO slate at the municipal election early in November. If this is successful it may have a far-reaching effect on industrial conditions.

Most of the accessory plants are well underway and making all kinds of preparations for the future. Notwithstanding all the uncertainties lying ahead with jittery conditions developing now and then, nearly every one in this mid-western area is confident the coming months will have much in the way of hope and cheer to offer.

The *Automatic Buffing Co.* is the name of a new concern recently organized in Kalamazoo with headquarters at 417 Pitcher Street, in that city, by *William G. Balz.* Its aim is to manufacture buffing machines, it is stated. Its capital stock is given as $50,000.

The *Chase Brass and Copper Co.*, is now occupying a new office and warehouse building on Woodrow Wilson Avenue, north of Oakman Boulevard. This is a new industrial area just coming into existence. The structure is 100 by 160, totaling 16,000 square feet, of which 3,000 square feet are devoted to offices. *W. C. Gram* is division manager here.

It is stated that employment will be increased 25 per cent by the *Keeler Brass Co.* when an addition to the plant, recently started is completed. It will increase the floor space by 13,000 square feet.

The *Briggs Manufacturing Co.*, it is announced, has purchased 74 acres on the south side of the Eight Mile road and the Michigan Central Railway where work will start at once, it is stated, on a plant to produce mountings and other automobile body parts. Cost of the land and the proposed plant and equipment, is estimated at about $3,000,000.

John H. Knapp has been promoted by the *Norge Corpn.*, manufacturers of refrigerators, to the position of assistant to the president. This will give him increased responsibility and at the same time releases more of *President Howard E. Blood's* time for his duties as executive vice president of the *Borg-Warner Corporation*, it is stated.

The *Frigidaire Division* of the *General Motors Corpn.*, has started production on a line of newly developed electric ranges, to be marketed nationally, as an auxiliary to its electric refrigerators. Manufacturing of this line marks the beginning of an expansion program by *General Motors* in the home appliance field, it is stated.

The 37th annual automobile show will open in Convention Hall, Detroit, on Nov. 6 and is to continue through until Nov. 13. The show committee has allotted space to 22 makes of passenger cars and to eight commercial cars. Returning to the ranks of cars to be shown this year will be the Hupmobile, it is stated.—F. J. H.

American Electro-Platers' Society

90 Maynard St., Springfield, Mass.

COMING BRANCH BANQUETS

The season for banquets is on. The Branches of the American Electro-Platers' Society are making active preparation for their Annual Open Educational Sessions and Banquets. Definite arrangements have been made for the following:

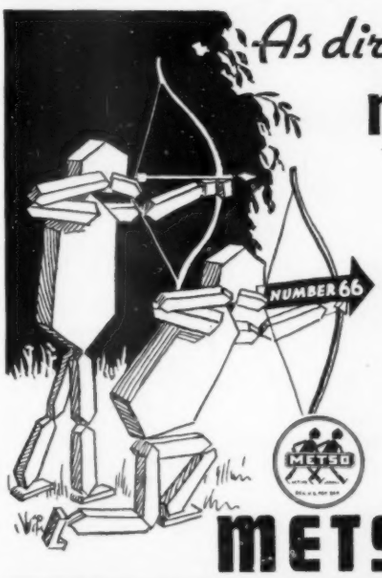
BOSTON. The last Saturday in February, 1938. Details later.

DETROIT. Saturday, December 4, 1937. Hotel Statler. Educational Session 1 P.M.; Dinner 7 P.M.; $3.00 per person. For information communicate with T. C. Eichstaedt, 679 Virginia Park, Detroit, Mich.

PHILADELPHIA. Saturday, November 20, 1937. Adams, 13th and Spring Garden Streets. For information communicate with R. E. Jackson, Jr., 125 E. Allen St., Philadelphia, Pa.

SPRINGFIELD, Mass. November 20, 1937. Highland Hotel; $2.00 per person. For information communicate with Henry Delarm, 330 Plainfield St., Springfield, Mass.

WATERBURY. First Annual Banquet, Dance and Educational Session. Saturday, November 6, 1937; Hotel Elton, Waterbury, Conn. Price $2.50 per person. For information communicate with E. T. Candee, American Metal Hose Branch, American Brass Co., Waterbury, Conn.



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METSO CLEANER 66

HERE'S the cleaner that hits the bull's eye every time. Metso goes straight to the center of grease and oil. Chemists describe that action as "high wetability", and platers everywhere measure it in terms of quick and complete grease removal.

Request a free sample, describing your particular problem.

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General Offices & Laboratory: 125 S. Third St., Philadelphia.
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METSO CLEANERS

Many times has the call come over the telephone when distracted metal fabricators have found a tough problem in metal cleaning before them.

MAGNUSON SERVICE and PERMAG CLEANING COMPOUNDS

always comes to the rescue of manufacturers who have cleaning difficulties which seem almost insolvable. Magnuson Service finds the answer—efficient, economical, satisfactory. Let us know of your problem.

MAGNUSON PRODUCTS CORPORATION

Third & Hoyt Sts. **BROOKLYN, N. Y.**

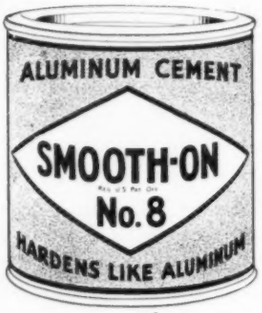
Manufacturers of Specialized Scientific Cleaning Compounds for Every Industrial Purpose.

Warehouses in principal cities throughout the U. S.
Representatives from coast to coast.
Canadian concerns please contact Canadian PERMAG Products Ltd.
Ottawa & Queen Sts., Montreal, P. Q. Canada.

PERMAG CLEANERS LEAD

Filling cement for ALUMINUM

SMOOTH-ON NO. 8



THIS cement is easily applied, adheres and hardens well, matches the color and surface texture of the surrounding metal, and can be filed, machined or polished to a fine finish.

As a filling for holes, rough surface or porous spots on castings, and for seams, cracks and open spaces between assembled parts, this composition gives the same satisfaction on aluminum as do the three grades of Smooth-On No. 4 Iron Cement on iron and steel surfaces.

The first application will prove its desirability for the purposes intended, and the saving of a few otherwise rejected pieces pays for all the cement required in a year. Make the trial and be convinced. The cost is almost nothing. Get free samples and see for yourself.

Buy Smooth-On No. 8 in ¼-lb. or 1-lb. can.

SMOOTH-ON MFG. CO., Dept. 18, 568-574 Communipaw Ave., Jersey City, N. J.

Do it with **SMOOTH-ON**

Mall
TRADE MARK

PORTABLE FLEXIBLE SHAFT GRINDERS

A type and size for every sanding, polishing, and buffing requirement!

POWERFUL
EFFICIENT
COST CUTTING
TOOLS

Write for descriptive literature and let us assist you in selecting the unit best suited for your work.

MALL TOOL COMPANY
7756 South Chicago Avenue
Chicago, Illinois

Offices and Distributors in all Principal Cities

Los Angeles, Calif.

October 22, 1937.

The *General Body Co.* making house and general housings trailers, will go in for national distribution.

Albert G. Pick Co. has built a large factory at Leavitt St. and West Pershing Road, making kitchen ware, refrigeration and restaurant equipment, *A. G. Jensen,* factory manager.

Robert S. Lemon & Co. have started an auto trailer factory at 1355 W. Ocean Ave., Long Beach.

The *Santa Fe Trailer Co.* has started in business making trailers at 825 Santa Fe Ave., *F. L. Young,* proprietor.

The *Consumers Light Corp.* has started making floor lamps at 5607 Santa Fe Ave., *J. Mead,* president.

The *Superior Cold Corp.* has taken a large factory building at 750 East 111th Place, to manufacture refrigeration equipment, *H. A. Kessler,* president.

Morris P. Kirk & Sons are building an addition to their factory, 2717 South Indiana St., for metal smelting and to manufacture lead and various metal products.

The *California Art Co.* making lamp shades, (about half of it metal) has moved to larger quarters at 1822 Cherry St.

The *Merit Water Heater Co.* at 1900 North Alameda St., Compton, has built a large addition to the factory.

A. J. Bayer Co., 2300 East Slauson Ave., Huntington Park, has built two large additions to the plant, to produce brass, bronze and iron castings.

The *Plomb Tool Co., C. H. Williams,* president, 2209 Santa Fe Ave., has started the erection of another factory.

The *Rowe Service Co.* have moved to 2811 South Hill St., where they will make vending machines.

The *Commercial Enameling Co.* has moved to 5861 Wilmington St., to enlarge their enameling plant, the castings foundry and to make plumber's lines.

The *Scientific Alloy Co.* has moved to 712 Slauson Ave., where they will manufacture corrosion and acid resistant metals for bearings, bushings, etc.

The *Fischer Corp.,* Glendale, has enlarged the plant at 673 Ivy St., to make medical equipment.

The *Associated Piping & Engineering Co.* are taking a large factory to make valves, fittings and bends.

The *Pacific Gas Radiator Co.* has enlarged its plant at 7615 Roseberry Ave., Huntington Park, *A. J. Hartfield,* president. They have put in modern machinery, plating plant, brass foundry and enlarged the water heater factory department.

The *Wire & Metal Mfg. Co.* will erect a new plant at Magnolia & Fruitland Road, Vernon. They will make all wire products, sheet metal and stampings.—H. S.

The North Pacific

October 22, 1937.

The *Standard Sanitary Mfg.* Co. has moxed from 395 Sutter St. to 278 Post St., San Francisco.

The *Reliance Truck & Trailer Co.* of 2765-16th St., San Francisco has spent $10,000 in enlarging the factory.—H. S.

Verified Business Items

Vacuum Systems, Inc., 436 The Arcade, Cleveland, Ohio, has been organized. This company has acquired and moved to Cleveland, Ohio, all of the assets of the *Crescent Pump Co.* of Detroit, Mich., which formerly manufactured the Crescent Roto-Piston dry vacuum pump. *William A. Hatcher*, inventor of the Crescent pump, has been retained as an engineer expert. Officers of the company: *Louis H. Mesker*, president; *B. E. Hathaway*, vice-president; *H. W. Dosey*, vice-president; *W. L. Holloway*, secretary.

M. L. Snyder & Son, Philadelphia, Pa., have moved to new and larger quarters at Jasper and York Sts., in that city. They have brought their fire extinguisher manufacturing factory to Philadelphia and are working as a complete unit.

Torrington Company, Torrington, Conn., announces that in connection with its new line of spring making machinery (see METAL INDUSTRY, September 1937, p. 461) the sales quota for the first six months has already been achieved. As a result, manufacturing facilities have been extended for increased production.

Pangborn Corp., Hagerstown, Md., held an employees' family plant visit day on October 8th. Luncheon was served and visitors enjoyed unrestricted hospitality of the plant. Sixteen hundred persons attended the housewarming. All employees were given a holiday with full pay and invited to bring their wives, children and parents.

Homestead Valve Mfg. Co., Coraopolis, Pa., announces appointment of the following as distributors of the "Hypressure Jenny," a steam vapor spray cleaner: *General Auto Supplies*, 219 E. Market St., New Albany, Ind., *Grinold Auto Parts, Inc.*, 354 Hudson St., Hartford, Conn., *Automotive Equip. Supply Co.*, 3306-10 Washington Blvd., St. Louis, Mo., *Cummings & Emerson*, 424 S. Washington St., Peoria, Ill.

The *Apex Plating Company*, has undertaken, under the Bulk Sales Law of the State of Michigan, to sell and convey to *Peninsular Metal Products Corp.*, 6635 Forest Ave. E., Detroit, Mich., all of its assets, in consideration of the payment of $18,000 in cash and the assumption by *Peninsular Metal Products Corp.* of liabilities of *Apex Plating Company* in the aggregate amount of $10,153.33. Notice of the above, dated October 2nd, stated that it was contemplated that the said agreement would be performed on or before ten days from that date.

Handy & Harman, 82 Fulton St., N. Y., manufacturers of gold, silver and platinum, have let general contract for two 1-story additions to their branch plant at Fairfield, Conn. Cost over $40,000 with equipment.

HAMMOND of KALAMAZOO

VARI-SPEED POLISHERS

RITE-SPEED POLISHERS

NOW you can wear your wheels from largest diameter to scrap size and maintain constant peripheral speed—insuring utmost efficiency. Only a minute required to change speeds.

Write for Bulletin No. 10 showing America's most complete line of Polishers and Buffers.

Hammond Machinery Builders INCORPORATED
KALAMAZOO, MICHIGAN, U.S.A.

Eastern Branch: 148 W. 23rd St., New York

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BUFFING LACQUER

for Cloisonne Reproductions

Air-Dry Priming Lacquer

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Elastic *Non-blushing*

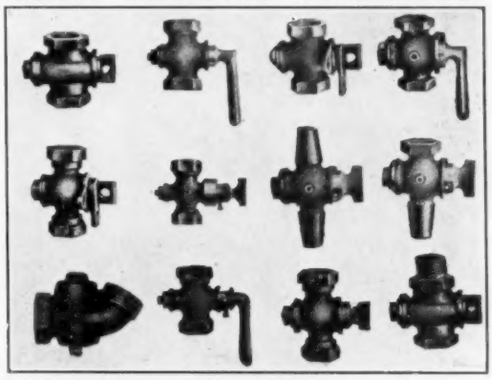
Agate Lacquer Mfg. Co., Inc.

11-13 Forty-third Road, LONG ISLAND CITY, N. Y.

Agateen —*The Last Word in Quality*

TURNER AUTOMATIC COCK GRINDING MACHINES

built in One, Four, Six and Eight Spindle sizes are used by all the leading Manufacturers of Ground Key work in the U. S. A. and foreign countries. Used in all the principal Railroad Shops for grinding Air Brake Cocks. These are a few of the many types ground on Turner Machines.



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921-923 W. Tioga Street, Philadelphia, Pa.

Manufacturers of Cock Grinding Machines, Double Head Key Lathes, Moulding Machines, Sprue Cutters

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MATCHLESS
REG. U.S. PAT. OFF.

DON'T TRY TO THINK YOUR COST
Know your cost beyond doubt
YOUR BUFFING ROOM COSTS
cannot be determined by guessing or assuming
ONLY A REAL TEST
with
MATCHLESS HIGH GRADE POLISHING WHEELS,
BUFFS AND BUFFING COMPOSITIONS
WILL PROVE
There is no substitute for "MATCHLESS"
The Matchless Metal Polish Co.
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The value of any product is based on the service it renders.
OUR Standard U.S.A. BRAND Felt Wheels
have the wearing qualities that reduce your total costs.
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The wheels will prove this on every test.
SHEET FELT—all grades and hardnesses
for Rubbing, Buffing, Polishing and Mechanical purposes. Evenly felted, no soft spots.
EASTERN FELT COMPANY
Manufacturers
Office and Factory Winchester, Massachusetts

INDUSTRIAL FILTERS FOR PLATING SOLUTIONS

QUALITY PLATING is now the leading "Talking Point" in Electroplating. A necessary requirement to produce such plating is that solutions are kept clean by filtration.

INDUSTRIAL FILTERS are guaranteed to operate at rated capacities and are constructed to stand-up on the job for which intended.

WRITE TODAY for our new complete price schedule, which includes specifications on filters specially designed for *HOT or BRIGHT* nickel solutions.

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3017 W. Carroll Avenue
Chicago, Ill.

Westinghouse Electric and Manufacturing Co., E. Pittsburgh, Pa. and *Carnegie Institute of Technology*, have joined in a co-operative educational enterprise in a new program of undergraduate engineering training. The Westinghouse company has appropriated $200,000 to the Carnegie Institute of Technology, to make it possible for a number of students with superior qualifications to take the usual technical courses for a degree and during the same period to get extensive shop and engineering experience and training in the Westinghouse plant. Of the group of students who will be selected to follow the co-operative course about 10 each year will receive *George Westinghouse Scholarships*, which will provide them with an income of $50 per month during the five-year training period. This project is a part of the campaign of the Carnegie Institute to raise $4,000,000, one-third of which may be in buildings. If this sum is raised the Carnegie Corp. of New York will add $8,000,000 in 1946, thus making a total of $12,000,000.

The *Golden Gate International Exposition*, 585 Bush St., San Francisco, Calif., will include a Hall of Health and Science. Spectators will be shown how scientists turn light into sound and sound into light and how gold may be extracted from sea water. In the Palace of Electricity and Communications will be shown "black light," "electronic music," the "electric eye," smashing the atom; television, etc.

Ferro Enamel Corp., Cleveland, Ohio, has established four new Fellowships at *Case School of Applied Science, University of Illinois, Ohio State University* and *Alfred University*. They also have in existence the *Cushman Fellowship* at *Western Reserve University*, Cleveland, which has been granted this year to *Nelson Perry Nies* at the *California Institute of Technology*. All of these Fellowships will be devoted to a research in porcelain enameling.

James F. Lincoln Arc Welding Foundation, Box 5728, Cleveland, Ohio, announces that governors of 29 states have expressed interest in the $200,000 Award Program. Engineers, designers, architects, production managers and others throughout the country are studying redesign for arc welding in preparation for writing papers for the Award Program. This Program closes June 1st, 1938.

Thompson Products, Inc., 2196 Clarkwood Rd., Cleveland, Ohio, has appointed *Paul D. Hileman*, general manager of its subsidiary, the *Jadson Motor Products Co.* of Bell, Calif. *Mr. Hileman* was Detroit representative for *Thompson Products, Inc.*, for the past nine years.

Philadelphia Electric & Mfg. Co., 1236 N. 31st St., Philadelphia, Pa., has taken title to building which they have occupied for some years.

Washington Mills Emery Mfg. Co., North Grafton, Mass., manufacturer of abrasive products, is rebuilding part of mill recently destroyed by fire. Cost close to $35,000 with equipment. Department: grinding.

Connecticut Telephone & Electric Corporation, Meriden, Conn., is now operating as a subsidiary of the *Air Devices Corp.* The company was formerly located in Chicago, and is engaged in the manufacture of air conditioning equipment, heater fans and refrigeration equipment. The *Thermal Units Mfg. Co.*, a subsidiary of *Air Devices, Corp.*, is also located in Meriden and manufactures unit heaters, coolers and humidifiers. Departments operated: tool room, metal spraying, grinding, polishing and buffing, lacquering.

North American Aviation, Inc., 5701 Imperial Highway, Inglewood, Calif., has erected a factory adjacent to the Los Angeles Municipal Airport. The plant is 400,000 sq. ft. of modern stucco and steel construction, which, together with machinery and tools, represents an investment of possibly $2,000,000. The plant is now employing 1,800 men with a backlog of over $10,000,000 worth of contracts for military airplanes. Departments operated: brass machine shop, tool room, casting shop, cutting-up shop, stamping, soldering, brazing, tinning, grinding, polishing and buffing, electroplating, lacquering.

The *Manhattan Rubber Mfg. Division of Raybestos-Manhattan, Inc.*, Passaic, N. J. was recently awarded honorable mention for their industrial trade paper advertising at the annual convention of the National Industrial Advertisers Association held in Chicago.

Construction of a large, modern manufacturing building which will provide the *Detroit Rex Products Company* of 13005 Hillview Avenue, Detroit, Michigan with approximately 30,000 square feet of additional floor space has been completed by the *Austin Company*, Industrial Engineers and Builders. Officers of the company are: *R. A. Emmett*, President; *W. W. Davidson*, Vice-President in charge of sales; *C. F. Dinley*, Vice-President in charge of research and engineering; and *G. E. Powers*, secretary-treasurer.

The *Detroit Rex Products Company* of Detroit, Michigan has opened a branch office located in the Provident Bank Bldg. at Cincinnati, Ohio.

Industrial Bearing and Foundry Co., 17-21 Newark Way, Maplewood, N. J., recently has been incorporated. Departments operated: bronze, brass and aluminum foundry; brass machine shop, grinding.

Penn Brass & Copper Co., 1130 W. 18th St., Erie, Pa., operators of redrawers of small sizes of seamless brass, copper and aluminum tubing, have asked bids on general contract for a one-story addition, 150 x 350 ft. Cost over $100,000 with equipment.

Industrial Filter & Pump Mfg. Co., has moved to their new address, 3017 W. Carroll Ave., Chicago, Ill.

Homestead Valve Mfg. Co., Coraopolis, Pa., announces the appointment of distributors of their Hypressure Jenny, steam vapor spray cleaner: *Gibson Co.*, 433 No. Capital Ave., Indianapolis, Ind.; *The Keyes Co.*, 115

GOLD, SILVER and COPPER
BRONZE POWDERS
ALUMINUM PASTE and PAINT
For All Industrial Purposes

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Samples & quotations upon request

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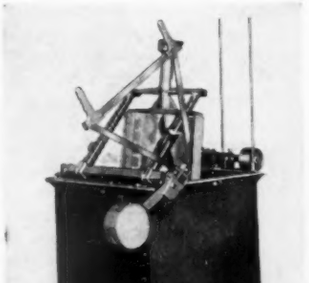
CRESCENT BRONZE POWDER CO.
118 W. Illinois St. Chicago, Ill.

DANIELS PLATING MACHINES Patent No. 1936382

Designed to reduce the cost of plating small articles in bulk



TYPE O.L.S. Made in Four Sizes

THE machine is built strong and operates rapidly due to a novel feature in the designing of the conductor frame. The frame has a four point contact so placed in the bottom of the container that the current is equally distributed to all articles being plated. The result is a uniform deposit; eliminates the depositing or treeing of metal on any part of the machine.

DANIELS PLATING MACHINE CO., INC.
129 Oliver Street, Newark, N. J.

Polish to a Mirror-Like *Finish with*
ORIENTAL
COMPOUNDS
STAINLESS STEEL
is polished to a Mirror-Like finish with Oriental Compounds. Rouges and Compositions for Gold, Sterling, Silver Plate and other metals. They produce a durable and economical finish.
We invite your inquiry.
Oriental Rouge Co., Inc.
Established 1901
FACTORY: 66-68 PINE STREET BRIDGEPORT, CONN.

W. 5th St., East Liverpool, Ohio; *Minneapolis Iron Stores Co.*, 512 N. Washington Ave., Minneapolis, Minn.; *Dyke Motor Supply* of Akron, 372 S. Broadway, Akron, Ohio; *Canton Hardware Co.*, 122-3rd St., N.W., Canton, Ohio.

Magnuson Products Corp., Hoyt & Third Sts., Brooklyn, N. Y., manufacturers of Permag cleaning compounds, announce that they have enlarged their laboratory facilities in order to broaden and increase the value of their research service to their customers. Office space has also been enlarged and personnel increased to enable the corporation to handle promptly and accurately the increased business which they are enjoying. It is definitely stated that due to research work under way, the corporation will shortly make available additional cleaning compounds and solvents for the metal working industry.

Metal Products Corporation Earnings

NET PROFIT UNLESS FOLLOWED BY (L) WHICH IS LOSS

	1937	1936
American Machine & Metals (3rd quarter)	$85,354	$56,856
Anaconda Wire & Cable Co. (3rd quarter)	609,688	764,266
Doehler Die Casting Co. (9 mos. to Sept. 30)	936,209	710,552
E. I. du Pont de Nemours & Co., (Third quarter)	22,063,089	23,875,048
Federal Mogul Corp. (9 mos.)	310,772	329,010
General Cable Corp. (3rd qu rter)	919,999	1,068,924
General Electric Company (9 mos.)	39,663,931	26,533,667
Hoskins Manufacturing Co. (9 mos.)	501,082	393,160
International Silver Co. (3rd quarter)	167,897	119,972
Revere Copper & Brass, Inc. (9 mos.)	2,277,241	1,413,956
Yale & Towne Mfg. Co. (Thir l quarter)	214,539	344,151 (preceding quarter)

Metal Finishes at the Business Show

The 1938 Business Show was held at the Port of Authority Building, New York City, October 18-23, 1937. This Show always includes a great many exhibits of business equipment, machines, etc., all of which are made partly or wholly of metals. The business machine industry has grown to be one of the large consumers of metals and alloys and naturally, at the same time, one of the important users of metal finishes of all kinds.

The designers whose products are shown in this year's exhibit have in general, worked for simplicity and reduction in weight. Black with chromium trim was in evidence widely, while greens and grays were also employed. The use of colors seems to be generally reserved for special orders and wood grain finishes on metal were less in evidence than formerly. The trend toward black and chromium is explained by the fact that this combination harmonizes with the modernistic fixtures and furniture now in vogue. While the wrinkle finish is widely used, one manufacturer stated that he was returning to the use of smooth lacquer as the wrinkle collects dust and requires brushing to clean.

The *Standard Register Co.*, 590 Madison Ave., N. Y. City, is employing the Alumilite process, producing an attractive black and frosted silver effect on the aluminum cases of their portable autographic register. This concern has also succeeded in bonding rubber to the Dowmetal registrator platens of their tabulating, typewriting and other business machine equipment. Cash drawers of cast aluminum alloy has replaced wood in some of the new models manufactured by the *National Cash Register Co.*, Dayton, Ohio. The *Bassick Co.*, Bridgeport, Conn. is now using Durex bushings in its chair controls. This bushing alloy is impregnated with oil and it is entirely enclosed so that no dust can enter and no further lubrication is required throughout the life of the chair.

Following is a list of exhibitors whose products require metals, alloys and metal finishes in their construction.

Acme Cary System Co., 342 Madison Ave., N. Y.

Addressograph - Multigraph Corp., 329-5th Ave., N. Y.

Allen-Wales Adding Machine Corp., 515 Madison Ave., N. Y.

Amberg, A. J., Business Equipment Corp., 480 Canal St., N. Y.

American Automatic Electric Sales Co., 21 E. 40th St., N. Y.

American Automatic Typewriter Co., 326 Broadway, N. Y.

Art Metal Construction Co., 369 Broadway, N. Y.

Bassick Co., 475-5th Ave., N. Y.

Better Packages, Inc., 109 Mercer St., N. Y.

Bircher Co. Inc., 387 Broadway, N. Y.

Boorum & Pease Co., 349 Broadway, N. Y.

Burroughs Adding Machine Co., 219-4th Ave., N. Y.

Coxhead, Ralph C. Corp., 17 Park Pl., N. Y.

Dawn Mfg. Co., 104-5th Ave., N. Y.

Dick Co., A. B., 225 Broadway, N. Y.

Dictaphone Sales Corp., 420 Lexington Ave., N. Y.

Dictograph Products Co., Inc., 580-5th Ave., N. Y.

Edison, Thomas A. Inc., 444 Madison Ave., N. Y.

Edwards & Co. Inc., 79 Madison Ave., N. Y.

Elliott Addressing Machine Co., 117 Leonard St., N. Y.

Faber, Eberhard Pencil Co., 37 Greenpoint Ave., Brooklyn, N. Y.

Friden Calculating Machine Co., 432-4th Ave., N. Y.

General Electric Co., Schenectady, N. Y.

General Fireproofing Co., 500-5th Ave., N. Y.

General Shaver Corp., Bridgeport, Conn.

Greist Mfg. Co., 347-5th Ave., N. Y.

Hires, Charles E. Co., 4216-13th St., L. I. City, N. Y.

Hooven Automatic Typewriter Corp., 352-4th Ave., N. Y.

Hunter Electro-Copyist Inc., 118 E. 25th St., N. Y.

Hush-A-Phone Corp., 43 W. 16th St., N. Y.

International Business Machines Corp., 270 Broadway, N. Y.

Mail-O-Meter Co., Inc., 11 W. 42nd St., N. Y.

Marchant Calculating Machine Co., 79 Madison Ave., N. Y.

Markwell Mfg. Co. Inc., 200 Hudson St., N. Y.

McCaskey Register Co., 101 W. 31st St., N. Y.

Monroe Calculating Machine Co., 11 Park Pl., N. Y.

National Blank Book Co., 100 6th Ave., N. Y.

National Cash Register Co., 205 E. 42nd St., N. Y.

Oxford Filing Supply Co., 340 Morgan Ave., Brooklyn, N. Y.

Parrot Speed Fastener Corp., 37-18 Northern Blvd., L. I. City, N. Y.

(*Continued on page* 602)

Western The Source of Precision Products

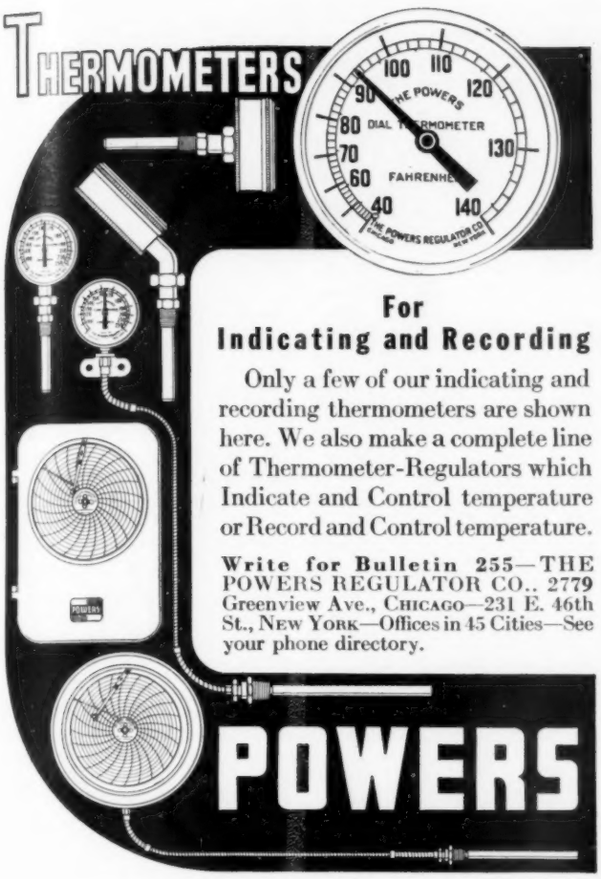
Today, many large manufacturers in leading industries use Western metals exclusively. They have found that Western metals stamp out waste and save them thousands of dollars annually. Western engineers and craftsmen work with tools, gauges and machines as precise as those of a watchmaker. Western customers get the benefit of this fine workmanship which has built up a reputation for precision that just didn't happen over night. That's why it will pay you to standardize on Western metals.

WESTERN CARTRIDGE COMPANY, EAST ALTON, ILLINOIS

BRASS : BRONZE : PHOSPHOR BRONZE : NICKEL SILVER

Western BRASS PRODUCTS Western Cartridge Company East Alton Illinois

THERMOMETERS



For Indicating and Recording

Only a few of our indicating and recording thermometers are shown here. We also make a complete line of Thermometer-Regulators which Indicate and Control temperature or Record and Control temperature.

Write for Bulletin 255—THE POWERS REGULATOR CO., 2779 Greenview Ave., CHICAGO—231 E. 46th St., NEW YORK—Offices in 45 Cities—See your phone directory.

POWERS

POWERS Self-Operating

Temperature Regulator

Reduce Production Costs

—with Powers automatic temperature control for Degreasers—Metal Parts Washing Machines—Plating, Pickling and Bonderizing Tanks—Dryers—Ovens —and Quenching Systems.

Only a few of our many different types of controls are shown here. Write for bulletin.

THE POWERS REGULATOR CO.
2779 Greenview Ave., Chicago, Ill.

Offices in 45 Cities—See your Phone Directory

POWERS

★ TEMPERATURE AND HUMIDITY CONTROL ★

MEETING WITH APPROVAL

From Massachusetts to California!

From Florida to Wisconsin!

MULTI-EDGE

The New Anode for Chrome Plating

Its 8 Corners give

Greater Throwing Power

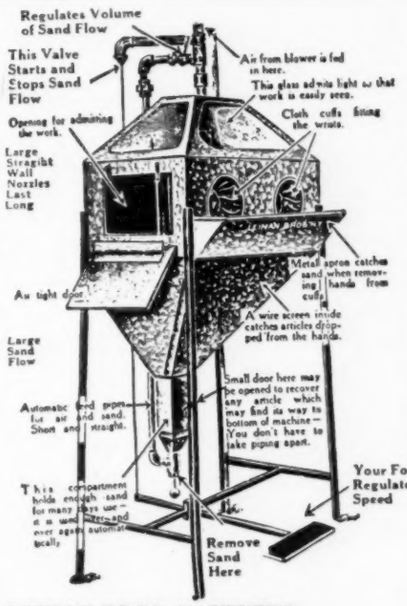
The many repeat orders we are getting from satisfied users in all parts of the country are ample proof of our claims for the superiority of MULTI-EDGE.

Order From The Following Supply Houses:

FREDERIC B. STEVENS, INC.—Detroit, Buffalo, Indianapolis, New Haven, Mansfield, Ohio.
HANSON-VAN WINKLE-MUNNING CO.—Chicago, Cleveland, Detroit.
THE UDYLITE CO.—Detroit, Cleveland, Chicago, New York, San Francisco.
REYNOLDS-ROBSON SUPPLY CO.—Philadelphia.
ALLIED INDUSTRIAL PRODUCTS CO.—Chicago.
GENERAL SUPPLY CO.—Cleveland.
POTTTER CLEVELAND SUPPLY CO.—Cleveland.
PLATERS SUPPLY, INC.—Cleveland.
A. T. WAGNER CO.—Detroit.
CHAMBERLAIN CO., INC.—Los Angeles.
THE FROST-NAUS CO.—Minneapolis.
THE MIDWEST BUFF CO.—Cleveland.

Or write to

REPUBLIC LEAD EQUIPMENT CO.
7928 Jones Rd. **Cleveland, Ohio**


Regulates Volume of Sand Flow
This Valve Starts and Stops Sand Flow
Air from blower is fed in here.
This glass admits light so that work is easily seen.
Cloth cuffs fitting the wrists.
Opening for admitting the work.
Large Straight Wall Nozzles Last Long
Metal apron catches sand when removing hands from cuffs.
An tight door
A wire screen inside catches articles dropped from the hands.
Large Sand Flow
Small door here may be opened to recover any article which may find its way to bottom of machine—You don't have to take piping apart.
Automatic feed pipes for air and sand. Short and straight.
This compartment holds enough sand for many hours use—it is used over again automatically
Your Foot Regulates Speed
Remove Sand Here

LEIMAN BROS. PATENTED CONTINUOUS FEED

CLEAN HARDENING SCALE QUICKLY

for Better Machining
Better Plating Enamel or Paint

MAT OR SATIN FINISH

NO ACIDS

UNIFORM RESULTS

SAND BLAST

A LABOR SAVER IN CLEANING MOULDING SAND FROM CASTINGS

LEIMAN BROS., INC., 171 CHRISTIE ST. NEWARK, N. J.
NEW YORK CO., 23 WALKER STREET
MAKERS OF GOOD MACHINERY FOR 50 YEARS

COLD ROLLED STEEL BRASS AND COPPER

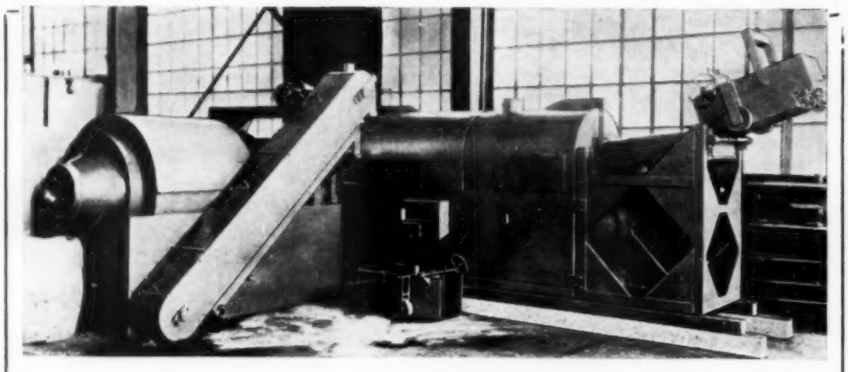
Metal Cleaning
IS NO LONGER A PROBLEM
with

ULTREX
MODERN
Cleaners and Solvents

A New Scientific Achievement
BRINGS YOU BETTER AND FASTER CLEANING RESULTS
At Unusually Low Cost

ALUMINUM WITHOUT ETCHING DIE CAST AND OTHER METALS

ULTREX CHEMICAL PRODUCTS, Inc.
257 Freeman St. Brooklyn, N. Y.



A Better Method of Ball Burnishing

Ball burnishing—always desirable—may be made economical if you can eliminate costly hand labor. This Ideal machine takes batches from burnishing barrels, washes and rinses them, automatically separates balls from work, discharges cleaned balls to shop buggy for return to barrel, sends cleaned work to final drum where it is thoroughly dried in hot sawdust and discharged into shop cans. Balls are never manually handled, are washed after each burnishing operation.

May we quote you on an installation tailored to fit your particular requirements?

N. Ransohoff Inc.

West 71st Street at Millcreek
Carthage, Cincinnati, O.

Zialite
Reg. U. S. Pat. Off.

Check These Advantages

1. *"Non-Strike"—no need for high initial current density.*
2. *Higher Throwing Power—plates uniformly into deepest recesses.*
3. *No Black Streaks on zinc at any current density.*
4. *A Dense, Adherent Deposit of fine grain structure.*
5. *Easy to Use—a non-critical bath, simple to maintain at full efficiency.*
6. *Economical—better work at lower over-all cost.*

Write today for full particulars

THE ONE
Nickel-plating Solution
FOR 100
Plating Problems

"Problem" jobs are all in the regular day's routine in plants where Zialite solution is being used for every nickel-plating purpose. Objects with parts of different metals; zinc or zinc-base die-castings; complicated shapes with deep recesses; bright plate on brass or copper—all go through with a minimum of operating difficulties and rejects and a maximum of economy.

ZIALITE CORPORATION • 521 FIFTH AVENUE, NEW YORK, N. Y.

Postage Meter Co., 11 W. 42nd St., N. Y.
Pronto File Corp., 636 Broadway, N. Y.
Rapid Addressing Machine Co., 117 Leonard St., N. Y.
Royal Typewriter Co. Inc., 2 Park Ave., N. Y.
Shaw-Walker Co., 405 Lexington Ave., N. Y.
Sikes Co., 18 E. 41st St., N. Y.
Spiral Binding Co. Inc., 148 Lafayette St., N. Y.
Standard Mailing Machines Co., 15 Moore St., N. Y.
Standard Register Co., 590 Madison Ave., N. Y.
Underwood Elliott Fisher Co., 1 Park Ave., N. Y.
Visible Records Equipment Co., 500 5th Ave., N. Y.

Metal Market Review

OCTOBER 22, 1937.

Copper during the past four weeks led the metal parade—downward. The panic on the New York Stock Exchange, spread to all commodities and all metals, practically without exception. After holding at 14c per lb. electrolytic, since April 29, the domestic market for copper finally cracked suddenly to 13c, 12c rebounded to 12½c and slumped again to 12c, where it now stands. In the meantime foreign copper and export prices zoomed much lower but have since improved, probably in sympathy with the rebound of the stock market during the last few days, the present price CIF being 11.30. All but one of the American producers maintained the 13c price.

The market in the meantime has been completely disorganized, the only steady heads seeming those of the bulk of the American producers. Buying, of course, has been weak until the last few days when heavy purchases were made (about 8,000 tons on October 21 for example). Domestic sales, week by week, were 4,877; 11,802; 4,427; 4,038 tons, a total of 25,144 tons, compared with 32,852 in the previous 5 weeks and 87,514 in the preceding four. Sales in September were 28,936 tons compared with 69,229 tons in August.

Statistics for September showed that refined stocks increased in the United States by 18,137 tons whereas the supply abroad decreased 4,710 tons. Blister stocks not revealed in the regular statistics decreased 7,239 tons in the United States but increased 6,718 tons abroad. The net gain, therefore, in world stocks of blister and refined metal was 12,908 tons. This is not a large rise, but immediate prospects are decidedly nervous.

LATE FLASH: On Oct. 26th all producers lowered their quotations to 12c, Valley.

Zinc also took a nose-dive, dropping ¾c to 6.50c per pound, Prime Western, East St. Louis on September 29, due to the increased supplies of metal coming in from abroad at 6.35c duty paid. Shortly afterward another cut brought the American price to 6.25. About October 15th, the price was again cut to 6c. In the meantime domestic sales were very light although shipments were fair to good; imports heavy.

Stocks of domestic zinc increased 2,290 tons during September to a total of 13,517 tons; unfilled orders declined from 106,187 tons in August; 92,319 in September. Prospects questionable.

LATE FLASH: On Oct. 25th the price was reduced to 5.75 E. St. Louis.

Tin, needless to say, joined in the activity enthusiastically and dropped between September 24th and 30th from 59.125 to 55.625c per pound Straits. The decline continued without abatement until October 20th when it touched the low point of 48.375, rising the next day to 50.25, a small matter of almost 2c in one day.

Statistics from the International Tin Research and Development Council showed that American consumption increased 13% in 1937 over 1936 from 71,583 tons to 80,857 for the twelve-month period ending with August. The total apparent world consumption increased 9.1%.

Prospects unknowable.

LATE FLASH: By Oct. 27th tin had slid downward to 47.75.

Lead was no stranger to the downward movement, dropping from 6.35c per pound St. Louis to 5.85 between Sept. 24 and 30. Buying continued to be modest, however, and on Oct. 15 quotations were reduced first to 5.60 and then to 5.35 on Oct. 18th. Sales week by week being 1,163; 3,965; 1,600 and 3,338, a total of 10,066 tons compared with 19,250 for the previous 5 weeks and 34,972 for the preceding four. Refined lead stocks dropped 12,800 tons.

Silver stayed apart from the crowd, remaining dull and unchanged in the United States at 44¾c per oz. Troy, and with little trading and very slight changes in the foreign markets.

Platinum suffered from the general weakness, slipping from $47.00 per oz. Troy as last listed here, to $45.50-46.

LATE FLASH: The drop continued to $42-3 on Oct. 28.

Antimony was the one metal to move against the trend. Beginning the last four-week period at 17.25c per pound American (Chinese not quoted) it rose to its present figure of 18.25c per pound Chinese with American still at 17.25.

Scrap Metals, needless to say, were tossed about by the whirlwind in sympathy with the copper market which fluctuated from hour to hour. Copper bearing scrap gyrated wildly and other types went steadily downward until October 21st when a revival took effect. Brass ingot prices were cut. Aluminum prices were easier. Business dull.

LATE FLASH: The drop in copper and zinc during the week of Oct. 25th disorganized secondary markets. Aluminum also weak.

The combined deliveries of brass and bronze ingots and billets by members of the Non-Ferrous Ingot Metal Institute for the month of September amounted to a total of 6,683 tons compared with 7,115 tons in August. On October 1st unfilled orders for brass and bronze ingots and billets on the books of members of the Institute amounted to a total of 18,641 net tons compared with 22,311 net tons on Sept. 1.

The Institute reports the average prices per pound received by its members on commercial grades on principal mixtures of ingot brass as follows:

	4 wks. end. Oct. 1	4 wks. end. Sept. 3
80-10-10 (1½% Imp.)	15.543	16.316
78% Metal	11.833	13.547
81% Metal	11.813	13.745
83% Metal	13.014	13.730
85% Metal	13.249	14.117
No. 1 Yellow Brass Ingot	10.575	11.377

Average Prices for Metals

	Sept.
COPPER c/lb. Duty 4c/lb.	
LAKE (del. Conn. Producers' Prices)	13.902
ELECTROLYTIC (del. Conn. Producers' Prices)	13.780
CASTING (f.o.b. ref.)	13.357
ZINC (f.o.b. E. St. Louis) c/lb. Duty 1¾ c/lb.	
Prime Western (for Brass Special add 0.05-0.10)	7.179
TIN (f.o.b. N. Y.) c/lb. Duty Free, Straits	58.619
LEAD (f.o.b. St. L.) c/lb. Duty 2½ c/lb.	6.234
ALUMINUM c/lb. Duty 4 c/lb.	20.000
NICKEL c/lb. Duty 3 c/lb. Electrolytic 99.9%	35.000
ANTIMONY (Amer.) c/lb. Duty 2 c/lb.	16.589
SILVER c/oz. Troy, Duty Free	44.75
PLATINUM $/oz. Troy, Duty Free	47.821
GOLD—Official U. S. Treasury Price $/oz. Troy	35.000

Whether it's a heavy-duty job, or delicate jewelry finishing . . .

KALYE

SAVES *time*

SAVES *material*

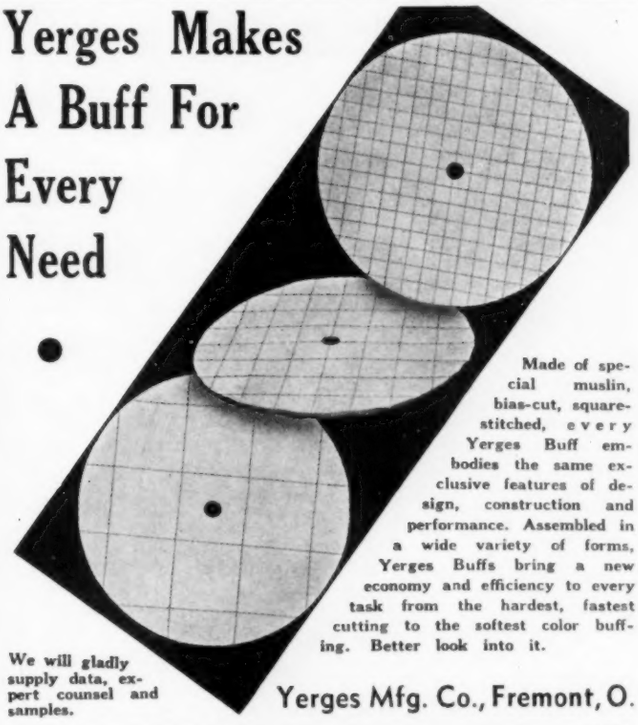
Recommended by 50 years of brilliant service on the most varied and exacting cleaning jobs.

Not the cheapest . . .
but *cheapest in the long run!*

Send for free copy of the Kalye manual.

RUMFORD CHEMICAL WORKS
RUMFORD, RHODE ISLAND

Yerges Makes A Buff For Every Need



Made of special muslin, bias-cut, square-stitched, every Yerges Buff embodies the same exclusive features of design, construction and performance. Assembled in a wide variety of forms, Yerges Buffs bring a new economy and efficiency to every task from the hardest, fastest cutting to the softest color buffing. Better look into it.

We will gladly supply data, expert counsel and samples.

Yerges Mfg. Co., Fremont, O.

YERGES

Supply Prices, October 28, 1937

Anodes

Prices, except silver, are per lb. f.o.b., shipping point, based on purchases of 2,000 lbs. or more, and subject to changes due to fluctuating metal markets.

COPPER: Cast ..... 22⅞c. per lb.
Electrolytic, full size, 17⅝c. cut to size ..... 17⅝c. per lb.
Rolled oval, straight, 18⅛c.; curved ..... 19⅛c. per lb.
BRASS: Cast ..... 21½c. per lb.
ZINC: Cast ..... 13½c. per lb.

NICKEL: 90-92% ..... .45 per lb.
95-97% ..... .46 per lb.
99%+cast, 47c.; rolled, depolarized, 48.
SILVER: Rolled silver anodes .999 fine were quoted Oct. 28, from 48c. per Troy ounce upward, depending on quantity.

White Spanish Felt Polishing Wheels

Diameter	Thickness Under ½"	½-15/16"	1-2"	2-3½"	Over 3½"
Under 1"	6.35-6.40	6.20-6.25	6.10-6.15	6.10-6.15	6.35-6.40
1" to 1 7/16"	5.85	5.70	5.60	5.60	5.85
1½" to 3 15/16"	5.55	5.35-5.40	5.30-5.35	5.30-5.35	5.60
4-5 15/16"	4.95-5.00	4.70-4.85	4.65-4.75	4.65-4.75	4.95-5.00
6", 8" & 9"	3.80-4.25	3.45-3.95	2.45-3.05	2.45-3.00	2.90-3.35
10" to 18"	3.80-4.25	3.45-3.95	2.45-2.95	2.45-2.85	2.90-3.25
Over 18"	3.80-4.25	3.45-3.95	2.70-3.05	2.70-3.00	2.90-3.35

Prices above are for less than 50 lb. For 50 to 99 lb. deduct 5% from list; for 100 lb. and over deduct 10%.

ODD DIAMETERS: (7" & 11" to 17"). Less than 50 lb. add 40c per lb. to above "Even Diameters" list. 50 lb. or over—all one size and consistency and in one shipment—same as "Even Diameters" list above.

On grey Mexican wheels deduct 10c per lb. from above prices.

Cotton Buffs

Full disc open buffs, per 100 sections when purchased in lots of 100 or less are quoted:

16" 20 ply 84/92 Unbleached	$75.24
14" 20 ply 84/92 Unbleached	57.67
12" 20 ply 84/92 Unbleached	43.28
16" 20 ply 80/92 Unbleached	63.28
14" 20 ply 80/92 Unbleached	48.57
12" 20 ply 80/92 Unbleached	36.52
16" 20 ply 64/68 Unbleached	59.69
14" 20 ply 64/68 Unbleached	45.84
12" 20 ply 64/68 Unbleached	34.49

⅜" Sewed Buffs, per lb., bleached or unbleached 54c to 90c

Chemicals

These are manufacturers' quantity prices and based on delivery from New York City.

Acetone C. P.	lb.	.06½
Acid—Boric (Boracic) granular, 99½+% ton lots	lb.	.05¼-.05¾
Chromic, 100 lb. drums		.16¼-.16¾
Hydrochloric (Muriatic) Tech., 20 deg., carboys	lb.	.027
Hydrochloric, C. P., 20 deg., carboys	lb.	.08
Hydrofluoric, 30%, bbls.	lb.	.07-.08
Nitric, 36 deg., carboys	lb.	.06
Nitric, 42 deg., carboys	lb.	.07½
Sulphuric, 66 deg., carboys	lb.	.02½
Alcohol—Butyl, drums (f.o.b. prod. pts.)	lb.	.10-.10½
Denatured, carloads	gal.	.35-.40
Alum—Lump, barrels	lb.	.0340-.0365
Powdered, barrels	lb.	.0355-.0380
Ammonia, aqua, com'l., 26 deg., drums, carboys	lb.	.02½-.05¼
Ammonium—Sulphate, tech., bbls.	lb.	.03½-.05
Sulphocyanide, technical crystals, kegs	lb.	.55-.58
Arsenic, white kegs	lb.	.04½-.05
Asphaltum, powder, kegs	lb.	.23-.41
Benzol, pure, drums	gal.	.41
Borax, granular, 99½+%, ton lots	lb.	.0255-.0305
Cadmium oxide, 50 to 1,000 lbs.	lb.	1.60
Calcium Carbonate (Precipitated Chalk), U. S. P.	lb.	.05¾-.07½
Carbon Bisulphide, drums	lb.	.05¾-.06
Chrome, Green, commercial, bbls.	lb.	.21½
Chromic Sulphate, drums	lb.	.26¼
*Copper—Acetate (Verdigris)	lb.	.25
Carbonate, 53/55% cu., bbls.	lb.	.16½-.17½
Cyanide (100 lb. kgs.)	lb.	.37
Sulphate, tech., crystals, bbls.	lb.	.057
Cream of Tartar Crystals (Potassium Bitartrate)	lb.	.20¼-.20½
Crocus Martis (Iron Oxide) red, tech., kegs	lb.	.07
Dextrin, yellow, kegs	lb.	.05-.08
Emery Flour (Turkish)	lb.	.07
Flint, powdered	ton	30.00
Fluorspar, bags	lb.	.03½
*Gold Chloride	oz.	$18¼-23
*Gold Cyanide, Potassium 41%		$15.45
*Gold Cyanide, Sodium 46%		$17.10
Gum—Sandarac, prime, bags	lb.	.50
Shellac, various grades and quantities	lb.	.21-.31
Iron Sulphate (Copperas), bbls.	lb.	.016
Lead—Acetate (Sugar of Lead), bbls.	lb.	.12-.14¾
Oxide (Litharge), bbls.	lb.	.12½
Lime Compositions for Nickel	lb.	.09½-.11
Lime Compositions for Brass	lb.	.09½-.11
Mercury Bichloride (Corrosive Sublimate)	lb.	$1.58
Methanol, (Wood Alcohol) Pure, drums	gal.	.40½
Nickel—Carbonate, dry bbls.	lb.	.36-.41
Chloride, bbls.	lb.	.18-.22
Salts, single, 425 lb. bbls.	lb.	.13½-.14½
Salts, double, 425 lb. bbls.	lb.	.13½-.14½
Paraffin	lb.	.05-.06
Phosphorus—Duty free, according to quantity	lb.	.35-.40
Potash Caustic Electrolytic 88-92% broken, drums	lb.	.07¼-.08⅝
Potassium—Bichromate, casks (crystals)	lb.	.09
Carbonate, 98-100%	lb.	.06¾
Cyanide, 165 lbs. cases, 94-96%	lb.	.57½
Pumice, ground, bbls.	lb.	.03
Quartz, powdered	ton	$30.00
Rosin, bbls.	lb.	.04½
Sal Ammoniac (Ammonium Chloride) in bbls.	lb.	.05-.07½
*Silver—Chloride, dry, 100 oz. lots	oz.	.38
Cyanide, 100 oz. lots	oz.	.44
Nitrate, 100 ounce lots	oz.	.32¾
Soda Ash, 58%, bbls.	lb.	.02¼
Sodium—Cyanide, 96 to 98%, 100 lbs.	lb.	.17½-.22
Hyposulphite, kegs, bbls.	lb.	.03½-.06½
Metasilicate, granular, bbls.	lb.	2.75-3.15
Nitrate, tech., bbls.	lb.	.0325
Phosphate, tribasic, tech., bbls.	lb.	.03
Silicate (Water Glass), bbls.	lb.	.01½
*Stannate, drums	lb.	.33-.36
Sulphocyanide, drums	lb.	.30-.35
Sulphur (Brimstone), bbls.	lb.	.02¾
*Tin Chloride, 100 lb. kegs	lb.	.38
Tripoli, powdered	lb.	.03
Trisodium Phosphate—see Sodium Phosphate.		
Wax—Bees, white, ref. bleached	lb.	.60
Yellow, No. 1	lb.	.45
White Silica Compositions for Brass	lb.	.07½-.10
Whiting, Bolted	lb.	.02½-.06
Zinc—Carbonate, bbls.	lb.	.14-.15
Cyanide (100 lb. kegs)	lb.	.36
Chloride, drums, bbls.	lb.	.08
Sulphate, bbls.	lb.	.0405

* Subject to fluctuations in metal prices.

Metal Prices on page 606.

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Burn either Gas or Oil at your option

There is no "demand charge" for current that you do not use—no coal or coke or ashes to bother with, when your plant is equipped with Hausfeld Metal Melting Furnaces. Just open the valve on your gas line (during the months when gas is cheapest) or turn on your fuel oil valve when gas pressure is low—and presto! You have the hottest, most steady fire at the lowest possible cost. Down come your production costs! But your alloy analysis never changes!

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From our complete line of Anodes and Plating Chemicals we call your attention to the following.

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Nickel (all percentages)	Tin
Copper	Brass
Cadmium	Zinc

CHEMICALS

Nickel Salts	Copper Sulphate
Nickel Chloride	Copper Cyanide
Nickel Carbonate	Copper Carbonate
Chromic Acid	Cadmium Oxide

Manufactured by

THE McGEAN CHEMICAL COMPANY

CLEVELAND, OHIO

McGEAN CHEMICALS

Metal Prices, October 28, 1937

(Import duties and taxes under U. S. Tariff Act of 1930, and Revenue Act of 1932)

New Metals

COPPER: Lake, 12.125, Electrolytic, 11.75-12.00, Casting, 11.275.
ZINC: Prime Western, 5.75. Brass Special, 5.85.
TIN: Straits 48.50. LEAD: 5.30.
ALUMINUM: 20. ANTIMONY, Ch. 17.75.
NICKEL: Shot, 36. Elec., 35.
QUICKSILVER: Flasks, 75 lbs., $85.00. BISMUTH, $1.00.
CADMIUM, $1.60 (nom.). SILVER, Troy oz., official price, N. Y., Oct. 28, 44¾c. GOLD: Oz. Troy, Official U. S. Treasury price $35.00.
SCRAP GOLD, 6¾c. per pennyweight per karat, dealers' quotation.
PLATINUM, oz. Troy $42-$43.

Duties: Copper, 4c. lb.; zinc, 1¾c. lb.; tin, free; lead, 2½c. lb.; aluminum, 4c. lb.; antimony, 2c. lb.; nickel, 3c. lb.; quicksilver, 25c. lb.; bismuth 7½%; cadmium, 15c. lb.; cobalt, free; silver, free; gold, free; platinum, free.

Ingot Metals and Alloys

	Cents lb.	U. S. Import Duty	Tax*
No. 1 Yellow Brass	10.00	None	4c. lb.[1]
85-5-5-5	12.25	None	4c. lb.[1]
88-10-2	15.75	None	4c. lb.[1]
80-10-10	14.00	None	4c. lb.[1]
Manganese Bronze (60,000 t. s. min.)	11.75	None	4c. lb.[1]
Aluminum Bronze	16.00	None	4c. lb.[1]
Monel Metal Shot or Block	28	25% a. v.	None
Nickel Silver (12% Ni)	14.00	20% a. v.	4c. lb.[1]
Nickel Silver (15% Ni)	16.25	20% a. v.	4c. lb.[1]
No. 12 Aluminum	17.75-19.50	4c. lb.	None
Manganese Copper, Grade A (30%)	24-29	25% a. v.	3c. lb.[1]
Phosphor Copper, 10%	17.00	3c. lb.	4c. lb.[1]
Phosphor Copper, 15%	18.00	3c. lb.	4c. lb.[1]
Silicon Copper, 10%	22.00	45% a. v.	4c. lb.[1]
Phosphor Tin, no guarantee	58-68	None	None
Iridium Platinum, 5% (Nominal)	$48.50	None	None
Iridium Platinum, 10% (Nominal)	$51.00	None	None

Old Metals

Dealers' buying prices, wholesale quantities:	Cents. lb.	Duty	U. S. Import Tax
Heavy copper and wire, mixed	6½ to 6⅞	Free	4c. per pound on copper content
Light copper	5½ to 5⅞	Free	
Heavy yellow brass	3¼ to 3½	Free	
Light brass	3 to 3¼	Free	
No. 1 composition	6 to 6½	Free	
Composition turnings	5¾ to 6	Free	
Heavy soft lead	4¼ to 4½	2⅛c. lb.	
Old zinc	2¾ to 2⅞	1½c. lb.	
New zinc clips	3⅞ to 4	1½c. lb.	
Aluminum clips (new, soft)	14½ to 15	4c. lb.	
Scrap aluminum, cast	10¾ to 11	4c. lb.	
Aluminum borings—turnings	7½ to 8	4c. lb.	None
No. 1 pewter	28 to 30	Free	
Electrotype	5¼	2⅛c. lb.*	
Nickel anodes	29 to 30	10%	
Nickel clips, new	28 to 29	10%	
Monel scrap	7½ to 15	10% av.	

* Duty is under U. S. Tariff Act of 1930; tax under Section 60 (7) of Revenue Act of 1932.
[1] On copper content. [2] On total weight. "a. v." means ad valorem.

* On lead content.

Wrought Metals and Alloys

The following are net BASE PRICES per pound, to which must be added extras for size, shape, quantity, packing, etc., or discounts, as shown in manufacturers' price lists, effective since Oct. 26, 1937. Basic quantities on most rolled or drawn brass and bronze items below are from 2,000 to 5,000 pounds; on nickel silver, from 1,000 to 2,000 pounds.

Copper Material

	Net base per lb.	Duty*
Sheet, hot rolled	20⅛c.	2½c. lb.
Bare wire, soft, less than carloads	16⅛c.	25% a. v.
Seamless tubing	20⅞c.	7c. lb.

*** Each of the above subject to import tax of 4c. lb. in addition to duty under Revenue Act of 1932.**

Nickel Silver

Net base prices per lb. (Duty 30% ad valorem.)

Sheet Metal		Wire and Rod	
10% Quality	28 c.	10% Quality	30⅝c.
15% Quality	30⅛c.	15% Quality	35 c.
18% Quality	31⅜c.	18% Quality	38¼c.

Brass and Bronze Material

	Yellow Brass	Red 80%	Brass	Comm'l. Bronze	Duty
Sheet	18¼c.	19¼c.	20	4c. lb.	U. S. Import Tax 4c. lb. on copper content.
Wire	18⅜c.	19⅜c.	20¼	20%	
Rod	14⅝c.	19⅜c.	20⅛	4c. lb.	
Angles, channels	26⅝c.	27⅝c.	28½	12c. lb.	
Seamless tubing	20⅞c.	21⅝c.	22⅜	8c. lb.	
Open seam tubing	26⅝c.	27⅝c.	28½	20% a. v.	

Tobin Bronze and Muntz Metal

(Duty 4c. lb.; import tax 4c. lb. on copper content.)

Net base prices per pound.	
Tobin Bronze Rod	20 c.
Muntz or Yellow Rectangular and other sheathing	21⅜c.
Muntz or Yellow Metal Rod	17½c.

Aluminum Sheet and Coil

(Duty 7c. per lb.)

Aluminum sheet, 18 ga., base, ton lots, per lb.	33.00c
Aluminum coils, 24 ga., base price, ton lots, per lb.	28.50c

Rolled Nickel Sheet and Rod

Net Base Prices

Cold Drawn Rods	50c.	Standard Cold Rolled Sheet	49c.
Hot Rolled Rods	45c.		

Monel Metal Sheet and Rod

Hot Rolled Rods (base)	35c.	No. 35 Sheets (base)	37c.
Cold Drawn Rods (base)	40c.	Std. Cold Rolled Sheets (base)	39c.

Silver Sheet

Rolled sterling silver (Oct. 28) 47c. per Troy oz. upward according to quantity. (Duty, 65% ad valorem.)

Zinc and Lead Sheet

	Cents per lb. Net Base	Duty
Zinc sheet, carload lots standard sizes and gauges, at mill, less 7 per cent discount	11.00	2c. lb.
Zinc sheet, 1200 lb. lots (jobbers' prices)	12.00	2c. lb.
Zinc sheet, 100 lb. lots (jobbers' prices)	16.00	2c. lb.
Full Lead Sheet (base price)	8.75	2⅝c. lb.
Cut Lead Sheet (base price)	9.00	2⅝c. lb.

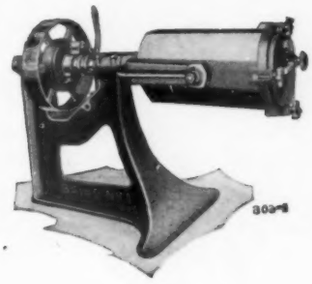
Block Tin, Pewter and Britannia Sheet

(Duty Free)

This list applies to either block tin or No. 1 Britannia Metal Sheet, No. 23 B. & S. Gauge, 18 inches wide or less; prices are all f. o. b. mill:

500 lbs. over	15c. above N. Y. pig tin price
100 to 500 lbs.	17c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price
Up to 100 lbs.	25c. above N. Y. pig tin price

Supply Prices on page 604.



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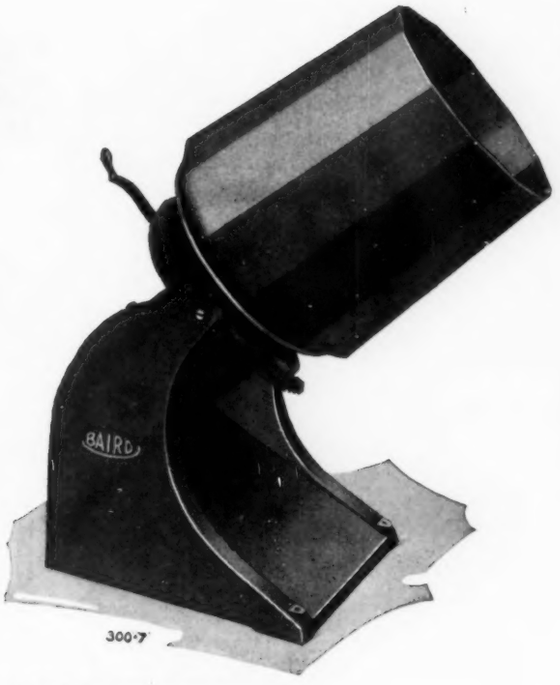

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FABRICATION - ASSEMBLING *"From Ingot to Finished Product"* PLATING - FINISHING

• CONTENTS •

VOLUME 35 DECEMBER, 1937 NUMBER 12

Editorial Comment 607

Automobiles in 1938 Will Use High Grade Metals and Fine Finishes—*By M. W. Schwarz* 608

Health Hazards in the Plating Industry—*Cleveland Branch A.E.S.* 610

Hot Lead Dip—*By W. J. Reardon* 614

Relative Thicknesses of Protective Coatings 614

Determination of Tartrate in Cyanide Copper Plating Solutions—*By Dr. Louis Weisberg* 615

Metals and Metal Finishes in Hotel Equipment—*By M. W. Schwarz* 616

A Study of the Rochelle Salt-Copper Cyanide Plating Bath—Part II—*By Dr. A. Kenneth Graham and Harold J. Read* 617

Corrosion Testing 621

Exposition of Chemical Industries 621

Vitreous or Porcelain Enameling—*By E. L. Stine* 622

Shop Problems	624	Obituaries	641
Metal Casting Digest—*By H. M. St. John*	626	News from Field Correspondents	644
Modern Production Equipment	627	Verified Business Items	646
New Books	635	Metal Market Review	648
Technical Publications	637	Manufacturers' Literature	Advt. 26
Government Publications	638	Supply Prices	650
Associations and Societies	639	Metal Prices	652
Personals	640	Annual Index	654

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